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PALM (B.). **A die-back disease of Metasequoia.**—*Bot. Notiser, 1952*, 4, p. 441, 1952.

At the beginning of June, 1952, the main shoots of two-year-old *Metasequoia disticha* plants growing under light shade in northern Scania, Sweden, developed symptoms of die-back attributed to *Botrytis cinerea*. In some cases the attack was restricted to the upper parts, while in others the disease spread quickly and caused the loss of most of the needles. At the end of July trees receiving sufficient light recovered, but in two others the infection eventually killed the plants.

THACKER (D. G.) & GOOD (H. M.). **The composition of air in trunks of Sugar Maple in relation to decay.**—*Canad. J. Bot.*, 30, 4, pp. 475–485, 1 pl., 3 graphs, 1952.

Air samples withdrawn from the trunks of sugar maple [*Acer saccharum*] growing near the Queen's University Biological Station, Ontario, varied considerably in composition, particularly in decaying trees. In all cases carbon dioxide occurred in much larger and oxygen in much smaller quantities than in the atmosphere. Carbon dioxide content was highest in the summer and lowest in mid-winter; oxygen varied reciprocally. Diurnal variations were also noticed.

The effect of carbon dioxide and oxygen on the growth of the maple rotting fungi *Corticium vellereum* [*R.A.M.*, 31, p. 51], *Pholiota adiposa* and *P. spectabilis* [loc. cit.], *Ganoderma applanatum* [ibid., 26, p. 429], *Polyporus* [*Polystictus*] *hirsutus* [ibid., 30, p. 390], *Ustulina vulgaris* [*U. deusta*], and *Hericium* [*Hydnum*] *erinaceus* [ibid., 30, p. 547] was measured by colony diameter increments. The *Pholiota* species appeared to be relatively insensitive to carbon dioxide tension. *C. vellereum*, *G. applanatum*, *Polystictus hirsutus*, and *H. erinaceus* showed a marked increase in growth with increased carbon dioxide until slight inhibition occurred at concentrations above 10 per cent. For all six species the optimum appeared to be 5 to 10 per cent., 15 to 20 per cent. causing inhibition, although at 35 per cent. growth was still appreciable. Of the six fungi (omitting *H. erinaceus*) tested for effect of oxygen only *P. hirsutus* showed any evidence, and that slight, that the concentrations of oxygen found within maples might play a significant role in its growth.

It is concluded that aeration is probably not an important factor in decay development.

GLENNIE (D. W.) & SCHWARTZ (H.). **Pulpwood decay: effect on yield and quality.**—*Paper Ind.*, 34, 9, pp. 738–740, 1952.

This survey of 19 contributions to the literature on the effect of decayed pulpwood on the quality and yields of groundwood, sulphite, and soda pulps was compiled at the Ottawa Forest Products Laboratories at the request of the fundamental research committee of the Technical Section, Canadian Pulp and Paper Association. It forms part of a more comprehensive review that includes chemical, physical, and biological studies of decay, as well as methods of measuring the process.

Goidànich (G.). **Caratteristiche generali della micoflora della pasta-legno.** [General characteristics of the mycoflora of wood pulp.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 51–66, 7 figs., 1951. [English summary.]

This paper has already been noticed from another source [*R.A.M.*, 28, p. 634].

Gadd (G. O.). **Observations on the development of fungi on pulp and a method to estimate the damages by them.**—*Paperi ja Puu*, 34, 4a, pp. 129–136, 12 figs., 1952.

At the Research Institute of the Finnish Pulp and Paper Industries, Helsinki, the author investigated the extent of the damage caused by fungal infection of wet pulp during storage [*R.A.M.*, 31, p. 155], using the method devised by Abrams for studies on the microbiological deterioration of cellulose [ibid., 29, p. 473]. The moulds *Cladosporium* sp., *Cadophora* [*Phialophora*] *fastigiata*, *Trichoderma lignorum* [*T. viride*], *Pullularia pullulans*, *Penicillium brevicaule*, *P.* sp., and *Stemphylium* sp., were inoculated into 21 small, laboratory-made bales. Since the infection by these organisms is localized and largely superficial, they are considered unlikely to be the cause of any appreciable decrease in strength, nor do mould stains in the pulp necessarily colour the manufactured product.

In inoculation experiments decomposition by *Polyporus* [*Polystictus*] *abietinus* proceeded very slowly, a year elapsing before the brown-stained areas disintegrated, so that weakening from this source during the normal storage period need not be anticipated, but the progress of *Lenzites sepiaria* was much more rapid, and after a year's storage the decay of the invaded area was too extensive to permit of further study. In 5½-month-old mill bales in a warm storehouse only 76·3 per cent. of the pulp remained in parts damaged by *L. sepiaria* [cf. ibid., 31, p. 74]. Such material is commercially valueless. Thus, some fungi may cause serious damage to pulp and others no measurable deterioration of either colour or strength; and, since a medium-sized pulp consignment, e.g., 100 tons, contains from 100,000 to 200,000 sheets, the examination of one or two samples will yield no clue as to its general condition.

Perilä (O.) & Seppälä (E.). **Pakuritäävän vaikutuksesta Koivupuuhun sekä tästä valmistetun sulfiitiselluloosan paperiteknillisiin ominaisuuksiin.** [The effect of the black tinder fungus on Birch wood and the paper-making properties of the sulphite pulp.]—*Paperi ja Puu*, 34, 10, pp. 359–365, 14 graphs, 1952. [English summary.]

Deciduous woods, particularly birch, are potential sources of pulp for manufacturing purposes in Finland. This study was carried out at the Institute of Technology, Helsinki, to determine the effect on birch wood of the very prevalent *Fomes nigricans* [*F. fomentarius*: *R.A.M.*, 18, p. 215] and on the utilization of wood from diseased trees in paper-making.

The fungus attacks the carbohydrates and cellulose more extensively than lignin, but in sulphite cooking the lignin does not dissolve as easily as that from sound wood. There is a substantial decrease in the strength of the cellulose fibres and the pulp of rotted wood is considerably darker than that of healthy trees and requires more bleaching. Moreover, *F. fomentarius* causes a decrease in the already not very adequate strength of birch wood paper.

Mártinez (J. B.). **Conservación de maderas en sus aspectos teórico, industrial y económico. Volumen I. Estudio técnico de los antisépticos de tipo oleaginoso.** [Wood preservation in its theoretical, industrial, and economic aspects. Volume I. Technical study of oil-type preservatives.]—550 pp., 113 pl., 57

figs., 33 graphs, Madrid, Ministerio de Agricultura, Instituto Forestal de Investigaciones y Experiencias, 1952.

Included in this treatise is a section on lignicolous fungi, representing the principal wood-destroying species of Spain and the Protectorate of Morocco (pp. 31–50, 29 pl., following p. 116), one on cellulose-destroying bacteria and actinomycetes (pp. 50–52), an annotated list of xylophagous fungi collected in Muni Territory, Spanish Guinea (pp. 119–128, 24 pl.), and information (between pp. 131 and 508) on the application of creosotes and other oil-type preservatives to the impregnation of timber. Abbreviated lists of contents are given in English (pp. 509–513) and German (pp. 514–519).

Among the records from Spanish Guinea may be mentioned *Polyporus zonalis* [*R.A.M.*, 27, p. 302] in association with *Daldinia concentrica* [ibid., 28, p. 607], *Irpex flavus* [ibid., 22, p. 118], *Xylaria hypoxylon* [ibid., 25, p. 513], *Daedalea sanguinea*, and *Trametes cinnabarina* [ibid., 32, p. 157], all on forest railway sleepers.

Purushotham (A.), Pande (J. N.), & Jadhave (Y. G.). **Wood preservation in India.**—*Indian For.*, 79, 1, pp. 49–65; 2, pp. 92–107, 8 pl., 8 figs., 1 map, 1953.

These two papers, the continuation and the end of a study by the authors [*R.A.M.*, 32, p. 53], discuss further the future scope and purpose of wood preservation in India and give a detailed description of treatments of railway sleepers, transmission, telegraph, and telephone poles, and timbers for furniture, packing cases, or other constructional purposes.

In stake tests (detailed results of which are given) at the Forest Research Institute, Dehra Dun, of heartwood pieces (24 by 2 by 2 in.) treated by the open tank process with Shaw Wallace creosote, the most durable (over 34 years before decay set in) were *Boswellia serrata*, *Pinus longifolia*, *Picea morinda*, *Abies pindrow*, *Bombax malabaricum*, *Anogeissus latifolia*, and *Odina wodier*. The most serviceable railway sleepers, all in the Delhi section, have been of *Cedrus deodara* pressure-treated with creosote and earth oil (40 : 60), 26 years; *Pinus longifolia*, similarly treated, 23 years; and *C. deodara* pressure-treated with 8 per cent. ascu [loc. cit.].

The second part, dealing more particularly with the fire protection of timber, includes a list of some of the fire-proofing compositions recently developed at the Forest Research Institute, Dehra Dun, as well as a list of some preservatives, their properties, and methods of application. Details are given of treating equipment and a method of calculating the cost of the treatment.

Bagchee (K.). **A new and noteworthy disease of Gamhar (Gmelina arborea Linn.) due to Poria rhizomorpha sp. nov.**—*Indian For.*, 79, 1, pp. 17–24, 6 pl., 2 figs., 1953.

In 1939 a disorder causing virtual strangulation and death of many gamhar (*Gmelina arborea*) trees in Muskumb plantations was noticed by the Divisional Forest Officer, Chittagong, Bengal, India. The disease, which was also found on *Melocanna bambusoides* and *Taraktogenos kurzii*, attacks well-spaced healthy trees in all aspects of a plantation and is first noticeable at the base of the plant from which white threads spread upwards from one stem to another and beneath the leaves and along the surface of the soil.

In 1947 the disease was very severe in the Muskumb plantations, wiping out many acres of gamhar. The earliest stage of the disease is the rotting of one or more of the bigger lateral roots a few inches below the surface of the soil, their ultimate death and, as a result, one-sided die-back of older trees. Cankers are formed at the base of the tree and spread rapidly, girdling saplings and young poles. The tree often dies before the symptoms of die-back can reach the crown. The thick bark of the stem becomes discoloured and peels off, exposing the sapwood which turns

a light cinnamon colour. The heart-wood turns a similar colour in the final stages of decay.

Poria rhizomorpha n. sp. was identified as the fungus responsible for the disease. Its sporophores are white, drying to a pale-pinkish buff and becoming light-pinkish cinnamon with age. The average size of the pores is 4 to 6 mm. and of the spores 4 to 5 by 2 to 2·5 (4·5 by 2·2) μ. The basidia are clavate, 12·5 by 4·5 μ; hyphal pegs simple or branched; and the rhizomorphs cord-like and white, becoming pale chamois on drying. The generative hyphae have clamp-connexions.

The fungus is found in the evergreen forests of North Bengal, North Assam, and Eastern Pakistan.

BAKSHI (B. K.). **Decay and sap stain of timber, their causes and prevention.**—*Indian For.*, 79, 2, pp. 108–114, 2 pl., 1953.

Measures necessary for the prevention of decay and sap stain of timber, caused by [unspecified] fungi, from the time the tree is felled until the timber is converted are briefly recapitulated; cultural methods of identifying these fungi, which are usually active between June–July and September–October in India [*R.A.M.*, 32, p. 158], are described. Winter felling is preferable and the trees should be cut into smaller logs, barked, and the surface brushed with a preservative (a list of which is supplied) within 48 hours for a temporary protection of logs. Immediate transportation to timber yards, the hygienic maintenance of which is described, is recommended, logs being stored there dry or completely submerged in water in log ponds.

SHIMAZONO (H.). **The biochemistry of wood-rotting fungi: the accumulation of oxalic acid.**—*J. Jap. For. Soc.*, 33, 11, pp. 393–397, 1951. [Japanese. Abs. in *Biol. Abstr.*, 26, 5, p. 1213, 1952.]

Previous studies on the formation of oxalic acid by wood-destroying fungi [*R.A.M.*, 31, p. 413] carried out in Japan have shown that the acid accumulates in a glucose-peptone medium inoculated with brown rot fungi but not with most white rot species. Similar results were obtained recently with potato glucose agar and 39 species of wood-rotting fungi. Sawdust decayed by *Poria vaporaria* [ibid., 18, p. 426] accumulated free oxalic acid and had a very low pH while that decayed by *Coriolus* [*Polystictus*] *versicolor* [loc. cit.] accumulated oxalate, the pH change being negligible. This feature, together with Bavendamm's reaction [ibid., 31, p. 263], may serve for diagnosing the form of wood-rot caused by the above-mentioned species.

Virus diseases in New York Cabbage.—*Seed World*, 71, 10, pp. 46–47, 1952.

Cabbage viruses A and B [*R.A.M.*, 31, p. 312] were present on cabbage, broccoli, Brussels sprouts, and cauliflower at the Experiment Station, Geneva, New York, in the summer of 1952. In inoculation experiments on cabbage seedlings Geneva Resistant Domestic 140 and Selected Danish were the least susceptible; Wisconsin All Seasons, Yellows Resistant Early Kraut, Wisconsin Ballhead, Robson's Seneca Danish, and Geneva Domestic 88, 89, and 139 were moderately susceptible.

STOLL (K.). **Die Kohlschwärze Entstehung, Schadwirkung und Bekämpfung.** [The origin, injurious effect, and control of *Brassica* blackening.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., 6, 5, pp. 81–85, 5 figs., 3 graphs, 1952.

Previous contributions to the subject of parasitic blackening (formerly designated pod necrosis) of crucifers (*Alternaria* [*brassicicola* and other species] excluding *A. brassicae*) are summarized, with special reference to its destructive effects on the cauliflower crop in the Magdeburg district of Germany [*R.A.M.*, 30, p. 133]. Other hosts of the fungi include various kinds of cabbage, Brussels sprouts, and radish.

The 51 isolates (of which six are referred to *A. tenuis*) tested for their pathogenicity to cauliflower pods fell into three groups, comprising four highly aggressive, inducing necrosis within a few days; 29 less aggressive, infection frequently becoming established only after a week; and 18 non-pathogenic. Appreciable damage to the seed need not be anticipated unless the infected pods burst before reaching maturity. The admixture of 0·5 per cent. of a wetter, nekal X, with various fungicides, especially lime-sulphur and polybar [ibid., 31, p. 444], greatly enhanced their efficacy in the control of the disease on Delfter Markt cauliflower; for Ostergruss summer radish only polybar plus nekal was effective.

Herold (F.). **Untersuchungen zur Rettichschwärze und zur Biologie ihres Erregers Aphanomyces raphani Kendr. in Vergleich mit weiteren Aphanomyces-Arten.** [Studies on Radish black root and the biology of its agent, *Aphanomyces raphani* Kendr., in comparison with other *Aphanomyces* species.]—*Phytopath. Z.*, 19, 1, pp. 79–125, 22 figs., 2 diags., 3 graphs, 1952.

Aphanomyces raphani is responsible for heavy losses of radishes in southern Germany [*R.A.M.*, 31, p. 536]. In Stuttgart nurseries, for instance, crop reductions often amount to 50 or 60 and may rise to 70 or 80 per cent. A detailed description of black root symptoms is given. In the author's detailed studies at the Bonn Phytopathological Institute the fungus could be isolated only from root sections in the pale to dark grey transitional zone between healthy and diseased tissue on filtered oatmeal agar, and even then isolation was only partially successful. Pure bacteria-free cultures of *A. cochlioides* [ibid., 30, p. 595], *A. cladogamus* [ibid., 26, p. 133], and *A. euteiches* [ibid., 31, p. 256] were readily obtained by Sleeth's technique [ibid., 25, p. 231], indicating that *A. raphani* is particularly sensitive in this respect. Inoculations with bacteria-free cultures of *A. raphani* gave rise to typical black root symptoms.

The growth habit of *A. raphani* is strongly influenced by the composition of the medium. On oatmeal agar, for instance, the aerial mycelium is shallow and barely visible, while oospores are produced in abundance. On X agar, consisting of equal parts of cherry, oatmeal, and peptone-glucose-saccharose agars, the aerial mycelium attains a height of 6 mm. and resembles cotton wool, a form of growth not hitherto reported in connexion with *A.* spp. It collapses after five to six days; no oospores are produced. In a 0·1 per cent. peptone solution *A. raphani*, *A. cochlioides*, and *A. cladogamus* gave rise to profuse zoned colonies, which were not obtained with cultures of *A. euteiches*. *A. raphani* also developed luxuriantly in radish root decoctions (200 and 100 mg. per 10 ml. water), whereas in leaf (200 and 50 mg.) and hypocotyl (200, 100, and 50 mg.) extracts mycelial growth was scanty and almost or quite without zones. The best media for both zoospore emission and oospore production were 0·001 per cent. peptone solution and decoctions of radish leaves and hypocotyls (50 mg. per 10 ml.). Germination of the oospores, of which there is apparently no previous record for *A. raphani*, took place by the production of a germ-tube after a minimum resting period of six weeks. Oospores in radish debris and in oatmeal cultures were germinated.

No correlation could be demonstrated between black root and boron deficiency. The disease is favoured by high soil moisture and its incidence is substantially higher in inoculated sand than in similarly treated compost soil or loam, while heavy infection also occurred in samples of Stuttgart soil. In pot experiments the percentage of infection in sand was reduced from 55·8 to 40·4 by amendment with a mineral fertilizer [ibid., 29, p. 490] at $2\frac{1}{2}$ times the normal dosage, but the lowest percentage of 1 occurred in pots of Stuttgart soil receiving only a quarter of the normal supply, compared with 8·4 and 9·3 for the normal and excess concentrations, respectively. Seed treatment with ceresan [ibid., 30, p. 90] and quinosol proved ineffectual for the control of black root, which attacks plants at all stages of growth

except the earliest. A reduction of losses to a tolerable limit (fixed at 10 per cent. of the crop by Stuttgart nurserymen) seems more likely to be achieved by judicious cultural practices and the gradual development of resistant varieties.

VANDERWALLE (R.). **La jaunisse des Navets.** [Turnip yellows.]—*Parasitica*, 6, 4, pp. 111–112, 1950.

For some years past turnips growing in various parts of Belgium, especially in sandy areas, have developed a yellowing of the foliage accompanied by marked reduction of growth [see next abstracts]. In many instances the percentage of plants affected was very high. In isolated plantings the first symptoms usually appear early in September, the disease starting in plots grown from the earliest sowings, but later all the plots become affected. A vinous red discoloration appears along the edge and near the tip of the leaf, followed by an intense chlorosis of the whole blade, which becomes hard and brittle. All the leaves are attacked in turn, except the central ones. The diseased plants remain dwarfed and develop badly, and have an abnormally small root without, however, any external or internal symptoms. Yield of roots is sometimes only one quarter of the weight of a normal crop. Insect and sap inoculations of tobacco plants gave rise to chlorotic spotting at inoculation sites. The spots later became necrotic.

VANDERWALLE (R.) & ROLAND (G.). **Contribution à l'étude de la jaunisse du Navet.** [A contribution to the study of Turnip yellows.]—*Parasitica*, 7, 1, pp. 14–15, 2 pl., 1951. [Flemish summary.]

Turnip yellows [see preceding and next abstracts] caused important losses in sandy areas in Belgium in 1950. The disease was experimentally transmitted from an affected plant to 16 of 20 healthy ones by *Myzus persicae*; 13 of the plants died. The authors propose to name the virus *Brassica* virus 5.

ROLAND (G.). **Étude de deux viroses du Navet : la mosaïque et la jaunisse.** [A study of two viroses of Turnip: mosaic and yellows.]—*Parasitica*, 8, 3, pp. 97–111, 2 pl., 1952.

In studies carried out at the Station de Phytopathologie de l'État, Gembloux, Belgium, a turnip plant with a delicate necrosis and curling of the young leaves, and yellowing of the outer ones was used as a source of virus inoculum. Two viruses were isolated, *Brassica* virus 1 [cabbage black ring spot virus: cf. *R.A.M.*, 31, p. 276; 32, p. 113] and *Brassica* virus 5 [see preceding abstract]. The former caused mosaic on turnip and was able to infect *Brassica* spp. [cf. ibid., 17, p. 152] and other hosts, including *Hirschfeldia incana*, *Rapistrum rugosum*, *Biscutella lusitanica*, *Capsella bursa-pastoris*, *Nicotiana langsdorffii*, and *Petunia hybrida*. *Brassica* virus 5 apparently attacks only turnip [ibid., 30, p. 216], causes yellowing or reddening of the outer leaves, gummosis of the phloem, and starch accumulation in the shoots and is not sap-transmissible.

Research work and workers.—*Seed World*, 71, 10, p. 40, 1952.

Pennvalley, a new cabbage variety resistant to yellows [*Fusarium conglutinans*: *R.A.M.*, 31, p. 541; 32, p. 68], developed from a cross between Penn State Ballhead and Wisconsin Ballhead at Pennsylvania State College, is now available in small quantities for trial.

HULL (R.). **The virus yellows war is not yet won.**—*Brit. Sug. Beet Rev.*, 21, 1, pp. 29–32, 1952.

Pointing out that 'peak' attacks of sugar beet yellows virus [see next abstract] tend to develop at four- or five-year intervals, the two previous epiphytotics in

Great Britain [*R.A.M.*, 31, p. 159] having occurred in 1945 and 1949, the writer suggests the possibility of further trouble in 1953 or 1954. Under a voluntary steckling certification scheme [ibid., 31, p. 169] carried out jointly by the National Agricultural Advisory Service, the agricultural staff of the British Sugar Corporation, and 11 seed-producing firms, all steckling beds are inspected in October and only those with less than 1 per cent. infection used for planting [cf. ibid., 30, p. 400].

The great danger of clamps as sources of infection is likely to be increased by the recent introduction of fodder beets, which in 1952 covered an average of 4 acres per 10 sq. miles, compared with 70 for mangolds. A survey of clamps in 19 factory areas revealed averages of 7·3 per cent. aphid infestation and 1·8 per cent. yellows in April and 21·1 and 5·4 per cent., respectively, in early May, the clamp infection potentials in the two months being computed at 0·08 and 0·19, respectively. These figures are slightly higher than the 1951 levels but considerably below those of the three previous years, despite exceptionally heavy aphid infestation.

Hull (R.). **Control of virus yellows in Sugar Beet seed crops.**—*J.R. agric. Soc.*, 113, pp. 86–102, 1952.

The author reviews and discusses recent research work carried out in Great Britain on virus yellows of sugar beet seed crops [*R.A.M.*, 31, p. 467] under the headings of virus yellows in relation to the seed crop, cultural factors affecting incidence, control by raising stecklings in isolation, control by insecticidal spraying, effect on seed yield, and the steckling certification scheme. Most of the points dealt with have already been noticed from various sources [cf. ibid., 28, pp. 370, 556; 29, p. 598; 31, p. 169, and preceding abstract].

Schürnbrand (E.). **Ein Beitrage zur Frage der Bedeutung der Sameninfektion durch Cercospora beticola.** [A contribution to the question of the importance of seed infection by *Cercospora beticola*.]—*Zucker*, 5, 13, pp. 295–299, 1952.

Evidence is adduced from recent experiments by the Bavarian Association of Sugar Beet Growers of the importance of seed infection by *Cercospora beticola* [*R.A.M.*, 31, p. 527 and next abstract], which in one trial was responsible for losses of 34·3, 17·5, and 21·6 per cent. respectively, in the foliage, root, and sugar yields. Seed may become contaminated either by the mycelium growing into the perianth leaves, which subsequently develop into the outer sheath of the fruit clusters, or by the clusters becoming infected with the conidia and sclerotia during threshing or later operations. The area under sugar beet in Lower Bavaria, Upper Palatinate, Upper Bavaria, and Swabia submitted for certification in 1951 covered only 1·5 ha. as compared with 47·4 in 1949, the corresponding figures for fodder beet being 98·5 (217·6) and for red beet 0·35 (13·15).

The slow but steady spread of leaf spot in a north-westerly direction does not support the view that the climatic conditions of the south-east are essential for the optimum development of the pathogen [ibid., 31, p. 364].

Rademacher [B.]. **Die Cercospora-Blattfleckenkrankheit bei Zuckerrüben.** [The *Cercospora* leaf spot disease in Sugar beets.]—*Zucker*, 5, 16, pp. 357–360, 1952.

After recapitulating information already presented on the biology and epidemiology of beet leaf spot (*Cercospora beticola*), which is extending its range in central and northern Germany with serious consequences [see preceding abstract], the author summarizes the results of experiments on its control at the Hohenheim (Stuttgart) Plant Protection Station.

The most effective of the seed treatments tested in 1951 was albertan 44 dust at a concentration of 600 gm. per doppelzentner [100 kg.], the rating assigned to which in a scale ranging from 0 (free from infection) to 5 (old leaves largely destroyed) was 1·9, as compared with 3·9 for the untreated and 2·1 for the same

preparation at 400 gm. The best results in the liquid series were obtained by seven minutes' immersion in 0·5 per cent. formalin (2·6) and 30 minutes in albertan 44 at 0·3 or 0·1 per cent. (2·9), as against 4·1 for the untreated.

Of the sprays tested to date, only those containing copper have shown any promise, notably ones with a high percentage of copper oxychloride or copper oxide, e.g., Bayer OB 21, collavin (which is adhesive), and Wacker 150 n. The average quantity required with modern appliances is 3 to 6 kg. per ha. Outside the principal zone of infection three treatments are sufficient, at the beginning and end of July and mid- to late August, while four should be given in the main area of infestation, at the end of June to early July, middle to end of July, beginning to middle of August, and end of that month, i.e., roughly at 25-day intervals for the former and 20-day for the latter regions. There is no evidence that treated leaves are poisonous to livestock, but as a precautionary measure spraying should be discontinued at the end of August. The average outlay for three applications (inclusive of labour and machinery) with a 45 to 50 per cent. copper-containing spray (costing DM.4 per kg.) at the rate of 5 kg. per ha. may be reckoned at DM.90.

Lowings (P. H.). **A disease of Peas.**—*Gdnrs' Chron.*, Ser. 3, 133, 3447, p. 40, 3 figs., 1953.

In July, 1952, about 80 per cent. of a garden pea crop in Northern Ireland showed symptoms of foot rot. Typical chlamydospores of *Thielaviopsis basicola* were obtained from beneath the surface tissues of a few plants but the majority of chlamydospores in the tissues belonged to the dark form of *Ascochyta pinodella* [*R.A.M.*, 31, p. 587]. In a preliminary pot experiment the latter was highly pathogenic to Little Marvel garden peas. The numbers of emergent seedlings from lots of 20 seeds (*a*) uninoculated, (*b*) inoculated with *A. pinodella*, (*c*) with *T. basicola*, and (*d*) dusted with thiram were 16, 4, 13, and 18, respectively. Leaf and pod spotting similar to the original was reproduced in plants sprayed with an aqueous pycnidiospore suspension of *A. pinodella* and the fungus was successfully reisolated from the leaf spots after surface disinfection.

This appears to be the first record of *A. pinodella* on peas in Ireland and of the occurrence of foot rot there. In England [ibid., 26, p. 69] the pathogen has been reported from Yorkshire, Sussex, Bedford, and Kent.

Osnitskaya (Mme E. A.) & Osipova (Mme N. I.). Фомоз Моркви. [Phomosis of Carrots.]—Сад и Огород [*Orchard & Garden*], *1952*, 9, pp. 60–62, 2 figs., 1952.

Carrot phomosis [cf. *R.A.M.*, 10, p. 293; 31, p. 99], a little known disease of carrots first observed in the U.S.S.R. in 1946 at the Pan Soviet Institute of Plant Cultivation and later reported from the southern regions of the country, was found to be due to *Phoma rostrupii* [ibid., 7, p. 701]. The disease, which was very severe in the Moscow region from 1949 to 1951, killing over 50 per cent. of seedlings on some farms, attacks the plant during the growing season and the winter and also the roots in the second year of culture. In the autumn greyish to brownish, elongated spots appear on the leaf petioles and veinlets. The affected tissue then becomes dry and brittle and breaks off easily. Roots, particularly the tips, are affected, dark spots sometimes appearing, but these symptoms are not very characteristic. The fruiting bodies of the fungus are absent. The disease spreads during the winter, larger parts of the root becoming covered with shallow dark lesions. Tip rot increases and the affected tissue disintegrates leaving hollows, the spots often becoming craters. About the middle of the winter black, sometimes pinkish pycnidia (5 mm. in diameter) appear on the affected tissue.

In seed crops the disease appears in two forms, (*a*) as a root rot, mostly of the tips, resulting in wilting of the whole plant, and (*b*) as a local infection of the stalk

and inflorescence. On the latter there are dark lesions and spots of a lilac shade at the stalk base and leaf nodes. The affected parts turn grey with age and masses of black pycnidia appear on the surface, even on the fruits. Usually several nodes on the stem are affected simultaneously in damp weather, the inflorescence, flower stalks, and bases of the umbel being similarly affected.

Spread of the disease occurs usually in damp weather. The growth of the fungus has a wide temperature range but is markedly arrested below 10° [C.]. Diseased seeds, infected both superficially and internally, serve as the primary source of infection. Pycnidia on one-year-old seed contained active spores. So far no data have been obtained on the period the fungus remains active in the soil, but by analogy with other similar diseases it is believed to remain viable for at least two to three years. The fungus is more harmful in light, sandy loam than in fertile clayey soil.

For the control of the disease a four-year crop rotation should be strictly observed and seedlings should be well away from first-year carrots. In laboratory seed disinfection tests granosan (4 gm. per kg. seed), 2 per cent. NIUIF–1 [ibid., 20, p. 296] (7 gm.), 50 per cent. thiram (10 gm.), and NIUIF–1 solution (1 in 300 for 10 minutes and 1 in 400 for 15) were all effective, the last-mentioned at 1 in 300 killing the fungus spores. Plant growth was somewhat delayed at first by all the treatments, but this was soon overcome and yields were equal to or greater than those of the [? uninfected] controls.

Cheo (P.-C.), Pound (G. S.), & Weathers (L. G.). **The relation of host nutrition to the concentration of Cucumber virus 1 in Spinach.**—*Phytopathology*, 42, 7, pp. 377–381, 1 graph, 1952.

In studies at the University of Wisconsin, Madison, to determine the effects of host nutrition on the concentration of cucumber virus 1 [cucumber mosaic virus: see below, p. 298] in Nobel spinach [*R.A.M.*, 32, p. 167], the plants grew best at a nitrogen level of 630 p.p.m. The virus concentration in expressed sap was closely correlated with plant development, and nitrogen levels that increased or decreased growth acted similarly on virus concentration.

The growth response to phosphorus appeared to vary with the season, but in general the maximum was reached at 93 p.p.m. Phosphorus levels sufficiently high (547 p.p.m.) to cause dwarfing did not reduce but increased virus multiplication, which attained a maximum at the highest phosphorus level.

The level of potassium and the concentration of balanced Hoagland and Snyder solutions [ibid., 14, p. 376] producing maximum growth likewise yielded the largest amounts of virus.

Raabe (R. D.) & Pound (G. S.). **Relation of certain environal factors to initiation and development of the white rust disease of Spinach.**—*Phytopathology*, 42, 8, pp. 448–452, 1 fig., 1 graph, 1952.

White blister of spinach (*Albugo* [*Cystopus*] *occidentalis*) [*R.A.M.*, 31, p. 589], which attacked all the commercial varieties and 89 foreign introductions tested at the University of Wisconsin, Madison, and also *Chenopodium capitatum*, develops more rapidly at 28° C. than at 16°, but cooler conditions are more conducive to its spread. Sporangial production is suppressed at high temperatures and very profuse at low ones, while warmth promotes abundant oospore formation, especially on seed plants.

Double-distilled water was the best of the media tested for sporangial germination, which was influenced neither by light nor by the season and took place over a wide pH range, though it was poor at either extreme. Pustules just beginning to open yielded a higher percentage of germinable sporangia than those at any other stage. The optimum temperature for germination was 12°, the minimum 2°, and

the maximum 25°. With an increasing amount of water loss from infected leaves, germination rose to a certain point (varying from plant to plant) and then declined or ceased.

Sill (W. H.), Burger (W. C.), Stahmann (M. A.), & Walker (J. C.). **Electron microscopy of Cucumber virus 1.**—*Phytopathology*, 42, 8, pp. 420–422, 1 fig., 1 graph, 1952.

Electron photomicrograph studies on cucumber virus 1 [cucumber mosaic virus: *R.A.M.*, 30, pp. 305, 404, 507] at the Departments of Plant Pathology and Biochemistry, University of Wisconsin, Madison, revealed ovoid to spherical particles with an approximate diameter of 350 Å. Aggregates of such particles were present in most of the preparations from infected cucumber corolla tissue but not in similar healthy material or diseased leaf samples. Owing to the presence of a virus inhibitor in the host [ibid., 32, p. 165] the infectivity of the leaf extracts was extremely low. In mounts made from infected tobacco leaf preparations the spherical particles presented the aspect of large, irregular clumps, generally overlaid with and surrounded by amorphous substances. Most of the infective material in tobacco leaf extracts was sedimented within 80 minutes at 5,000 × g and all at 10,000, whereas 36,000 × g was required for the sedimentation of cucumber corolla extracts in the same time. Evidently, therefore, the virus in the tobacco leaf extracts was either densely aggregated or combined with leaf tissue components. A correlation was noticed between infectivity and the presence of green tissue fragments in differentially centrifuged leaf extracts. Together with the generally high chloroplast content (3,000 × g pellets in the infective fractions from tobacco), these observations suggest the combination of the virus with chloroplasts or other tissue components and its consequent sedimentation with them.

Sill (W. H.) & Walker (J. C.). **A strain of Cowpea susceptible to systemic infection by various strains of common Cucumber mosaic virus.**—*Phytopathology*, 42, 8, p. 442, 1952.

Most strains of cucumber virus 1 [cucumber mosaic virus: see preceding abstract] induce local lesions on inoculation into unifoliate cowpea leaves. An important exception, however, is Whipple and Walker's strain 14, isolated from bean (*Phaseolus vulgaris*) [*R.A.M.*, 20, p. 334], which increases systemically in cowpea, culminating in mottling and stunting. In the course of inoculation experiments at the University of Wisconsin on several thousand plants of the Black variety with a local lesion-inducing strain of the virus, an occasional plant reacted exclusively by systemic symptoms. The possibility of strain 14 being present was rejected after due exploration, and thereafter any systemically infected cowpea plants which appeared were grown to maturity. The self-progenies of 79 such plants, tested with the same and two other distinct local-lesion-inducing strains, uniformly developed only systemic symptoms. Strain 14 also caused systemic infection in these progenies, whereas tobacco necrosis and tobacco ring spot viruses elicited local lesions. The systemic response is attributed to a mutation in the genes controlling resistance and susceptibility to systemic infection by the local-lesion strains, and studies are proceeding on the inheritance of the newly observed character. These observations are of interest to those using cowpea as a local lesion host for the cucumber mosaic virus and to those breeding cowpeas.

Struble (F. B.) & Morrison (Lou). **Control of Watermelon anthracnose ('pox').** —*Mimeogr. Circ. Okla. agric. Exp. Sta.* M-211, 2 pp., 1951. [Abs. in *Biol. Abstr.*, 26, 9, p. 2323, 1952.]

In 1950 watermelon anthracnose (*Colletotrichum lagenarium*) was a major factor in the reduction of the crop in Oklahoma. In addition to seed treatment crop

rotation and other cultural practices are recommended. The best control in field tests was given by zineb (dithane Z-78 [*R.A.M.*, 30, p. 302] or parzate), which was effective either in the form of a spray (2 lb. to 100 gals.) or a dust (8 per cent.) if applied when the first traces of the disease were detected.

Hughes (M. B.) & Van Haltern (F.). **Two biological forms of Pseudoperonospora cubensis.**—*Plant Dis. Reptr*, 36, 9, pp. 365–367, 1952. [Multilithed.]

The results of joint trials at Blackville, South Carolina, and Experiment, Georgia, to test the response of the A and C cucumber variety, Jumbo Hale cantaloupe, and the Congo and Georgia Wilt Resistant watermelon varieties to two isolates of *Pseudoperonospora cubensis* [*R.A.M.*, 31, pp. 226, 362; 32, p. 59], H from cucumber from Charleston, South Carolina, and V from watermelon from Griffin, Georgia, showed that these represent two separate and distinct biologic races [cf. ibid., 30, p. 356]. On watermelon, H produced only mild symptoms while V caused considerable damage. On all the hosts V produced yellowish blotches, spreading widely in the leaf before collapse of the tissues; symptoms of H were small spots with yellow borders, enlarging slowly and rapidly becoming necrotic at the centres.

Gigante (R.). **Il mosaico del Carciofo.** [Mosaic of Artichoke.]—*Boll. Staz. Pat. veg. Roma*, Ser. 3, 7 (*1949*), pp. 177–181, 3 figs., 1951.

In June, 1950, globe artichoke (*Cynara scolymus*) leaves were received from Sicily with bright yellow, circular, elliptical, polygonal, or irregular spots scattered over the whole surface of the blade and ranging from under 1 to 7 mm. in diameter. Sometimes two or three spots became confluent. Sap inoculations to healthy *C. scolymus* and *C. cardunculus* var. *utilis* plants gave rise to typical symptoms in three weeks. It is concluded that the condition is a form of mosaic due to a virus [cf. *R.A.M.*, 11, p. 162].

Report Mushroom Research Station, Yaxley, for year 1951.—58 pp., 2 figs., 8 graphs, 1952. 5*s*.

In the section of this report [cf. *R.A.M.*, 30, p. 556] dealing with studies on casing soil (pp. 21–43) R. L. Edwards and P. B. Flegg state that moderately high porosity to air is probably necessary. Experimental evidence demonstrated conclusively that soil with large aggregates gave a much better mushroom yield than mixed or fine. Panning down during the cropping period, which can result from repeated watering, also reduces permeability and yield. Mushroom mycelium exerts an aggregating effect on soils of poor structure, while in a soil originally of good structure continued breakdown by watering is arrested when the mycelium has become established. Watering twice a week caused less breakdown than using the same amount of water in one application per week.

Microbiological work by C[atherine] Duncan (pp. 44–50) showed that there was a general tendency for truffle (*Pseudobalsamia microspora*) [loc. cit.] to develop in inoculated tubes where the growth of mushroom mycelium was most rapid; and these tended to have a higher moisture content at the close of the experiment. On a commercial farm, where truffle was prevalent, none developed in compost sprayed with a solution containing $\frac{1}{2}$ lb. copper sulphate per ton, though a few small patches appeared in the untreated. In further experiments on the control of bacterial pit [*Bacillus polymyxa*: ibid., 31, p. 531] spraying with Bordeaux mixture (5–2–50), malachite green (0·01 per cent.), and Bordeaux (1–1–50), all at 1 pint per 10 sq. ft. of bed, gave, respectively, 69, 56, and 47 per cent. clean mushrooms, as against 1 per cent. for the beds sprayed with water. Zineb [loc. cit.] and thiram were both superior to Bordeaux mixture against *Mycogone perniciosa* under experimental conditions normal for a mushroom house in early summer.

On pp. 51–54 F. C. Atkins states that Noble Mushrooms Ltd. are now using the Mushroom Research Association's formula for synthetic compost [ibid., 29, p. 493; 30, p. 11] on a commercial scale to the complete exclusion of horse-manure composts [cf. ibid., 32, p. 59]. The average yield in 11 weeks' picking was 2·8 lb. per sq. ft. The procedure followed in stacking is described and the composition of the two activators used is given. It is concluded that a properly prepared M.R.A. synthetic compost is virtually indistinguishable from fully composted horse-manure, is at least equally productive, and costs about the same (£85 per 1,000 sq. ft.).

Do Amaral (J. F.). **Requeima do Pimentão.** [Chilli blight.]—*Biológico*, 18, 9, pp. 160–161, 1 fig., 1952.

Chilli blight (*Phytophthora capsici*) was observed for the first time in São Paulo, Brazil [cf. *R.A.M.*, 22, p. 380; 27, p. 204; 30, p. 212] in December, 1951, in the experimental field of an agricultural college, where it decimated a stand of over 10,000 plants in the course of a few days. The symptoms of the disease are described and recommendations made for its control by rational cultural practices and prophylactic applications of Bordeaux mixture.

Hafiz (A.). **Basis of resistance in Gram to Mycosphaerella blight.**—*Phytopathology*, 42, 8, pp. 422–424, 1952.

Morphological and physiological studies at the Punjab Agricultural College, Lyallpur, Pakistan, on types of *Cicer arietinum* susceptible and resistant to *Mycosphaerella rabiei* [*R.A.M.*, 21, p. 120] indicated that the greater number of hairs on the resistant F8 and F10, as compared with the susceptible P7 and P15, induces more extensive secretions of malic acid in the later growth stages and this in turn is detrimental to spore germination and germ-tube development. It was observed, moreover, that the fungus requires a longer period for the penetration of more resistant types, 96 hours being necessary to accomplish 100 per cent. infection of F8 and F10 as against 24 for P7. In the early stages of growth, however, when malic acid production is low, there is no difference between the two types in reaction to *M. rabiei*, escape from infection at this period being attributable merely to lack of inoculum and the prevailing low temperature and low humidity, which are unfavourable to the pathogen.

Boyle (L. W.). **Factors to be integrated in control of southern blight on Peanuts.**—Abs. in *Phytopathology*, 42, 5, p. 282, 1952.

Tests were carried out to determine the validity of the hypothesis that losses of groundnut crops [in Georgia] may be reduced by denying the agent of southern blight (*Sclerotium rolfsii*) [*R.A.M.*, 27, p. 66; 28, p. 53; 29, p. 605; 32, p. 119] a medium for growth in the upper stratum of soil, which provides the most favourable conditions for its development. Control of the disease could be accomplished independently on the root, stem bases, and at soil-level. For instance, 81 per cent. infection of the stem only was obtained in a stand where certain methods of land preparation and cultural practices were combined. Complete burial of weeds and crop refuse, leaving none above a 3-in. depth, reduced the incidence of root infection, while encouraging results were also given by pre-emergence treatment and flat culture.

Vitoria (E.) & Moyano (A. A. A.). **Informe sobre una enfermedad que afecta a los viñedos sanjuaninos en el departamento de Albardón.** [Report on a disorder affecting vineyards in San Juan in the Department of Albardón.]—*Experimenta*, 3, 7–9, pp. 8–10, 1951. [Abs. in *Hort. Abstr.*, 22, 1, p. 39, 1952.]

A disorder of vines, confined chiefly to Moscatel and characterized by inter-

veinal chlorosis of the young shoots, accompanied in advanced stages by necrosis, became widespread in Albardón, Argentina, during 1951. Preliminary observations suggest that it is due to zinc deficiency [*R.A.M.*, 31, p. 532].

Weber (F.) & Kenda (Griseldis). **Stomata-Anomalie von Opuntia-Virusträgern.** [A stomatal anomaly in viruliferous *Opuntia*.]—*Öst. bot. Z.*, 100, 1–2, pp. 153–159, 3 figs., 1953.

The 'protein spindles' (bundles of protein crystalloids) seen in the degenerate or abnormally developed stomata on leaves of *Opuntia subulata* in the Vienna Botanic Garden are believed to represent virus elements. They were not present in virus-free plants. Such anomalies may therefore serve as an index of infection in externally symptomless plants.

Stations fédérales d'essais agricoles de Mont-Calme et Montagibert, Lausanne et Pully. Rapport d'activité 1951. [Report for 1951 on the work of the Federal Agricultural Experiment Stations of Mont-Calme and Montagibert, Lausanne and Pully.]—*Annu. agric. Suisse*, 53 (N.S. 1), 9, pp. 915–1041, 2 figs., 13 graphs, 1 map, 1952.

During the period under review [cf. *R.A.M.*, 31, p. 223] *Typhula graminum* was observed on wheat [ibid., 30, p. 124] near Lausanne, this being the first record of its occurrence in French Switzerland. Dwarf bunt (*Tilletia caries* [or *T. brevifaciens*: ibid., 32, pp. 240, 257]) was present in some wheat fields at the foot of the Jura Mountains.

Tobacco root rot (*Thielavia* [*Thielaviopsis*] *basicola*) is common during the months of May and June, notably in the canton of Ticino and the Rhone Valley [C.M.I. map No. 218], where yields are reduced by the disease. Wildfire (*Phytomonas* [*Pseudomonas*] *tabacum*) is prevalent on tobacco in a Broye and develops sporadically elsewhere [*R.A.M.*, 17, p. 353].

Clasterosporium carpophilum developed with exceptional severity, though very late, on stone fruits [ibid., 29, p. 265 and below, pp. 303, 322], which were not adequately protected by sprays applied on the usual dates. The further extension of the pathogen in the peach orchards of Ticino [C.M.I. map No. 188] is a matter of concern to growers.

[Tobacco] ring spot virus was detected for the first time in Switzerland [ibid., No. 144] on potato plants of the Voran variety imported from Germany [*R.A.M.*, 32, p. 274] the previous autumn. Sporadic cases of ring spot infection occurred in a Burley Haronova tobacco crop situated about 300 m. from the potatoes, which presumably contracted the disease from this source.

Beet virus yellows, formerly unknown in French Switzerland [ibid., 30, p. 91], was observed in the canton of Vaud during the summer of 1950. Winter spinach [beet], widely grown round Lausanne, is a host of the virus, which spreads chiefly, however, from stored fodder beets [ibid., 32, p. 295]. During the winter of 1950–1 large populations of *Macrosiphum solanifolii* [*M. euphorbiae*] and *Myzus persicae* were detected on mangolds in a barn at Cery (Vaud) and in the following summer a crop of sugar beet about 500 m. away contracted severe yellows, which became apparent at the end of June; on 8th October the average incidence was 15 per cent. *M. persicae* was the most active of the aphid vectors, appearing at the beginning of June and developing abundantly in the centre of the field; *Aphis fabae* was not seen until the middle of the month, and then only on a few plants round the edge. In the same locality beet mosaic virus [ibid., 30, p. 91] spread extensively from mangold seed plants to the sugar beet crops. In 1951 the incidence of the disease was negligible, the situation being just the reverse, therefore, of that obtaining in the case of yellows.

[Unspecified] strawberry viruses are prevalent in Valais, where the tolerant leading variety, Madame Moutot, seldom shows any noticeable symptoms. The principal vector, *Pentatrichopus fragaefolii*, abounds in the main Rhone Valley up to an elevation of over 1,000 m. but is comparatively scarce in the side valleys at altitudes of 900 to 1,320 m., where the breeding of resistant clones might be feasible [cf. next abstract].

Since 1942 no fresh focus of potato wart (*Synchytrium endobioticum*) has been detected in French Switzerland, but the disease has assumed some importance in the German-speaking cantons and in Ticino [ibid., 31, p. 533], so that the possibility of its reappearance should not be overlooked.

Three viruses were transmitted to certain test plants by mechanical methods from red clover affected by a mosaic-like disease which was particularly noticeable in second-year seed plots. Type 950A, transmissible to bean [*Phaseolus vulgaris*], produces yellow, striate lesions between the veins of the leaflets, which may become slightly crinkled with advancing age; otherwise the plant develops normally. Type 950B causes weakness and stunting of the plants. The veins remain green but the intervenal areas are tinged with yellow and brown; necrotic dots develop. It is transmissible readily to bean and with difficulty to red clover. Infection by type Badoux A III results in slight crinkling of the leaflets, which bear striations and necrotic dots, as also do the stems and sheaths. The virus is transmissible mechanically to White Burley tobacco and *Datura stramonium* but apparently not to bean or red clover.

Viruliferous aphids were extraordinarily prevalent among potato stands in 1951. *Doralis* [*Aphis*] *rhamni* though sluggish is of considerable importance as a vector by reason of its large populations, especially at the beginning of June, when it is practically the sole species represented. Local observations have demonstrated the predominance of winged forms [ibid., 32, p. 144] in the spread of viruses.

Evidence is briefly adduced in support of the hypothesis that [infectious] degeneration [court-noué: ibid., 32, p. 170] of the vine is transmissible through the soil [ibid., 30, p. 403].

KOBEL (F.). **Jahresbericht 1949–1951 der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil.** [Annual report for 1949 to 1951 of the Federal Experiment Station for Fruit-Growing, Viticulture, and Horticulture at Wädenswil.]—*Annu. agric. Suisse*, 53 (N.S. 1), 6, pp. 563–699, 29 figs., 3 diags., 7 graphs, 1952.

The following information is presented in this report [cf. *R.A.M.*, 31, p. 49], some items of which have already been noticed from other sources. Experiments are in progress on the production of virus-free strawberry clones (p. 577) [cf. preceding abstract] at a high altitude in the canton of Grisons.

Of the 243 new plant-protectives submitted for testing during the period under review, 132 (roughly 54 per cent.) were approved (including nine organic fungicides, mostly of the thiocarbamin group), and 90 were already on the Swiss market in 1951 (pp. 592–594).

S. BLUMER (pp. 616–617) reports a case of tobacco mosaic virus transmission by ordinary tobacco dust, used as an insecticide in a horticultural establishment in 1951. Towards the middle of June the tobacco transplants showed severe malformations, accompanied by a conspicuous mottling of the lower leaves, which was readily transmissible to young White Burley tobacco plants. A striking chlorosis of tomato plants in the same garden was also transmissible to tobacco.

Experiments by S. BLUMER and A. HARDER (pp. 617–618) showed that *Rhizoctonia* [*Corticium*] *solani* may be more destructive to red cabbage seedlings in steam-sterilized than in untreated soils owing to the absence from the former of its normal antagonists [cf. ibid., 32, p. 277]. It is very important, therefore,

to avoid the recontamination of sterilized soil with dirty implements or diseased cuttings.

From 1944 to 1950 F. Schütz and J. Kundert (p. 621) carried out experiments (reported in *Gemüsebau*, *1951*) on the control of celery septoriosis [*Septoria apii*: ibid., 27, p. 273] on the Saxa variety. The best results were secured with 1·5 per cent. Bordeaux mixture, followed by copper oxychloride pastes and oxides. In combined fertilizer and spraying trials from 1947 to 1950 increasing the fertilizer enhanced the efficacy of the sprays, and it is concluded that both measures are necessary to ensure a profit from celery cultivation.

Luchetti (G.). **Rassegna dei principali casi fitopatologici osservati nel Ferrarese nel quadriennio 1948–1951.** [Report on the principal plant diseases observed in the Ferrara region in the four-year period 1948–1951.]—*Notiz. Malatt. Piante*, *1952*, 19, pp. 59–76, 1952. [Mimeographed. English summary p. 90.]

This report on parasitic and non-parasitic diseases of crop plants observed in the vicinity of Ferrara, Italy [cf. *R.A.M.*, 25, p. 539; 26, p. 143], contains, among others, the following items of phytopathological interest. Apple scab (*Fusicladium dendriticum*) [*Venturia inaequalis*: ibid., 21, p. 377; 30, p. 275] was particularly destructive and perhaps the most injurious of all diseases present. The Abbondanza variety shows good resistance. Apple powdery mildew (*Oidium farinosum*) [*Podosphaera leucotricha*: ibid., 2, p. 294; 32, p. 260] was very severe in 1951; two to four applications of wettable sulphur at fortnightly intervals gave complete control. The most serious disease of peach trees is gummosis [cf. ibid., 6, p. 298], caused by *Coryneum* [*beijerinckii*: *Clasterosporium carpophilum*: ibid., 17, p. 49 and above, p. 301 and below, p. 322]; one dormant application of 3 per cent. copper sulphate is stated to give control. A similar application at leaf fall or shortly after, followed by one of 6 per cent. barium polysulphide controls *C. carpophilum* and *Taphrina deformans* [ibid., 15, p. 235; 25, p. 438].

Voelcker (O. J.). **Report of the Department of Agriculture, Malaya, for the years 1950 and 1951.**—71 pp., 1 col. map, 1953.

In this report [cf. *R.A.M.*, 30, p. 508] it is stated that bronzing of oil palms [cf. ibid., 26, p. 487; 29, p. 11] is directly related to the amount of calcium in the leaf, those most severely affected having the highest calcium content; potassium is highest in the healthiest and best yielding palms. A species of *Ganoderma* resembling *G. pseudoferreum* but differing in mycelial growth was noted on a plant killed by stem rot.

Aspergillus parasiticus, imported from West Africa for the control of cacao mealybugs [? *Pseudococcus* spp.: cf. ibid., 29, p. 294], gave promising results when insects were introduced into test tube cultures, but no control was achieved on infested cacao in the field. Pod rot was generally caused by *Botryodiplodia theobromae* [cf. ibid., 32, p. 71] or occasionally associated with species of *Colletotrichum*, *Fusarium*, and *Nectria*. *Diplodia* die-back [*B. theobromae*] occurred several times following sun scorch after too early removal of shade.

Coffee plants growing in a nursery were killed by *Sclerotium rolfsii*, not previously recorded on this host in Malaya. Imported maize varieties at the Federal Experiment Station, Serdang, were severely affected by leaf spot (*Helminthosporium turcicum*) [C.M.I. map No. 257], the stems also being attacked; rust (*Puccinia sorghi*) was also prevalent.

Leaf blight of carrots (*Alternaria dauci*) [cf. *R.A.M.*, 31, p. 563] and anthracnose (*Colletotrichum lindemuthianum*) [C.M.I. map No. 177] of French beans [*Phaseolus vulgaris*] were satisfactorily controlled by weekly spraying with Bordeaux mixture or perenox. Panama disease (*Fusarium oxysporum* f. [var.] *cubense*) [ibid., No. 31] continued to injure banana plants used as shade for cacao.

Current research in the South Pacific in the field of economic development.—*Tech. Pap. sth. Pacif. Comm.* 29, 82 pp., 1952. [Multilithed.]

The following items of phytopathological interest occur in this report. Severe damage is caused in the orange groves of New Caledonia by collar rot (*Phytophthora citrophthora*) [C.M.I. map No. 35], and experiments at the Port Laguerre Farm School are in progress in the grafting of different varieties of young trees on the resistant bitter orange and *Citrus macroptera*, an indigenous species. Another important orange pathogen is *Oospora citri-aurantii*, carried by *Othreis fullonia*, a butterfly that pricks the fruits. Rapid decay sets in and may spread through an entire orchard. Studies are proceeding on *Septobasidium bogoriense* [*R.A.M.*, 27, p. 260] and a new *S.* sp., characterized by the formation of small spots in rings round the scale insects on citrus. The *S.* sp. was a constant associate of *Lepidosaphes beckii* and sometimes of *Chionaspis citri*. *Corticium salmonicolor*, the agent of pink disease of citrus, is also under investigation.

Dry rot (*Ustulina zonata*) is prevalent on coffee (*Coffea arabica* and *C. robusta*), as well as on the shade trees, *Albizzia lebbek*, *Erythrina fusca*, and *Leucaena glauca*. Another fungus found on coffee roots in New Caledonia is *Sphaerostilbe repens*.

Experiments in the control of cabbage black rot [*Xanthomonas campestris*] were unsuccessful, but the resistant Australian variety, Early Drumhead, has been introduced into the Territory.

A species of *Pseudococcus* is suspected to be concerned in the transmission of black pod rot of cacao (*Phytophthora palmivora*) in the New Hebrides. An investigation by Dr. C. Magee in 1951 confirmed the absence of bunchy top virus from the banana plantations of Papua and New Guinea. The disease was present, however, in *Musa textilis* plantings originating from an introduction to Karavat some 25 years earlier. He advised the destruction of all diseased plants after harvesting sufficient seed (which apparently does not transmit the virus) to build up new stocks.

Introductory (including glossary).—*Leafl. Pure Cult. Study Bact.* 1, 16 pp., 1952.

This is the tenth edition of this leaflet, revised by M. W. Jennison; it deals with the meaning of pure culture study of bacteria, relation of the study to taxonomy, the publications of the Committee on Technic, history of the Descriptive Charts used for recording the characteristics of bacterial cultures [*R.A.M.*, 29, p. 145] and of the Manual of Methods, use of the Manual, practical hints on identification (10 references), and glossary of terms used on the Chart of Cultural Characteristics and the Descriptive Charts.

Riker (A. J.). **Inoculations with bacteria causing plant disease.**—*Leafl. Pure Cult. Study Bact.* 10, 14 pp., [? 1952].

This leaflet [see preceding abstract] is the 4th edition of a reprint from *Pure Cult. Study Bact.*, 13, 1951 [*R.A.M.*, 22, p. 292], revised in collaboration with O. N. Allen, P. A. Ark, A. C. Hildebrandt, and E. M. Hildebrand, and includes in addition to the matters previously noticed brief sections on the use of cultures of pathogens from localities other than where inoculations are to be made and on the production of antibiotics in relation to inoculations.

Patel (M. K.), Kulkarni (Y. S.), & Dhande (G. W.). **Xanthomonas badrii sp. nov., on Xanthium strumarium L. in India.**—*Indian Phytopath.*, 3, 1, pp. 103–104, 1950. [Received March, 1953.]

This is a full account of the symptoms, morphology, cultural and physiological characters, and host range of *Xanthomonas badrii* n. sp. [*R.A.M.*, 32, p. 238] causing bacterial blight of *Xanthium strumarium* at Jalgaon, India, in August, 1948

[ibid., 29, p. 404]. In inoculation experiments it produced typical blight on *X. strumarium* and spots on pea plants.

LANCE (C.) & GAUTHERET (R.). **Sur la pérennité des propriétés tumorales des tissus de crown-gall et des tissus ayant subi le phénomène d'accoutumance aux auxines.** [On the perpetuation of the tumorous properties of crown gall tissues and of those having undergone the process of habituation to auxins.]—*C.R. Acad. Sci., Paris*, 235, 25, pp. 1682–1684, 1952.

In order to ascertain whether prolonged contact between a normal plant tissue and one infected by crown gall [*Bacterium tumefaciens*: *R.A.M.*, 27, p. 329; 28, p. 120] or habituated to growth substances could induce regression of their tumour-inducing aptitude, tissue fragments of the two latter were grafted on healthy White Burley tobacco plants by White's method [ibid., 24, p. 407]. A large number of tumours developed, and after 50 days fragments isolated from them were grafted on healthy Samsun tobacco plants, which likewise reacted by tumour formation. The grafting process was repeated twice more, contact between the sound and the tumorous tissues being maintained for a total period of 219 days.

The following results were obtained. The 17 plants grafted with crown gall and the 18 with habituated tissue on 20th November, 1951, produced 7 and 13 tumours, respectively, the corresponding figures for the 14 and 16 grafted on 9th January, 1952, being 11 and 5, respectively, for the 10 and 8 grafted on 15th March, 5 and 2, respectively, and for the 10 and 8 grafted on 3rd May, 3 and 4, respectively. At the close of the experiments, therefore, the tumour-inducing properties of the crown gall and habituated tissues were still operative.

Àrùn kòrìkòrì. Black pod disease.—32 pp., 19 col. figs., Cocoa Marketing Board, Public Relations Office, Nigeria, [? 1952].

This interesting publication produced by the Department of Agriculture, Western Region, Nigeria, with the English and Nigerian texts side by side outlines in simple language, along with the appropriate illustrations, the outstanding features of cacao black pod disease [*Phytophthora palmivora*: *R.A.M.*, 32, p. 12] and its prevention, for the benefit of native cacao farmers.

HOLLIDAY (P.). **The control of witches' broom disease of Cacao.**—*Proc. agric. Soc. Trin. Tob.*, 50, 4, pp. 393–395, 397, 399, 1950.

In this address to the Agricultural Society of Trinidad and Tobago on cacao witches' broom (*Marasmius perniciosus*) [*R.A.M.*, 31, p. 424] the author deals in particular with the control of the disease and strongly recommends the planting of less susceptible clones. Included among these [loc. cit.; ibid., 26, p. 97] are I.C.S. Nos. 6, 44, 98, and 95, I.C.S. 95 having only 1 to 3 per cent. pod losses, compared with 13 to 23 per cent. for I.C.S. 70, and being more resistant to pod infection than any other clone examined so far.

SIMMONDS (P. M.). **Root rots of cereals. II.**—*Bot. Rev.*, 19, 2, pp. 131–146, 1953.

This supplement to an earlier paper on cereal root rots [*R.A.M.*, 20, p. 455] reviews information which has appeared in the literature (74 titles) during the past ten years.

MACHACEK (J. E.) & WALLACE (H. A. H.). **Germination of treated and untreated seed of Wheat, Oats and Barley of different commercial grades.**—*Sci. Agric.*, 32, 11, pp. 597–602, 5 graphs, 1952.

This is a full account of work previously noticed from a shorter version [*R.A.M.*, 32, p. 122].

VANTERPOOL (T. C.). **The phenomenal decline of browning rot (Pythium spp.) on the Canadian Prairies.**—*Sci. Agric.*, 32, 8, pp. 443–453, 1 pl., 1952.

This is a full account of a survey of cereal browning root rot (*Pythium* spp.) in Canada, noticed from another source [*R.A.M.*, 32, p. 122].

BAYLES (B. B.) & TAYLOR (J. W.). **Wheat production in the eastern United States.**—*Fmrs' Bull. U.S. Dep. Agric.* 2006, 50 pp., 16 figs., 13 maps, 1951. [Received April, 1953.]

In this revision of a previous *Bulletin* (1817) a section (pp. 33–42) is devoted to various wheat diseases and their distribution in the United States and control; disease resistant varieties recommended for the eastern United States are given in an annotated list (pp. 7–22).

Vid Sveriges Utsädesförening samlade erfarenheta från 1951 års svartrostangrepp å Vete. [Experience gained at the Swedish Seed Association from the 1951 black rust epiphytotic on Wheat.]—*Sverig. Utsädesfören. Tidskr.*, 62, 2, pp. 76–151, 12 figs., 1 diag., 2 graphs, 1 map, 1952. [English summary.]

This article comprises eight contributions to various aspects of the wheat black rust (*Puccinia graminis*) problem in Sweden, based on observations of the 1951 epiphytotic at the Swedish Seed Association, Svalöf, and its four branches in other parts of the country. Some of the information has already been presented [*R.A.M.*, 32, p. 11]. According to Å. ÅKERMAN (pp. 77–82), the attack was the heaviest since the inception of breeding experiments at Svalöf in 1886. Owing to the rarity of severe outbreaks, breeding for resistance to black rust has been relegated to a secondary place, resulting in a generally low degree of tolerance among the native varieties. There is every reason to believe that infection originated about 20th July on barberry bushes [ibid., 31, p. 599] in the south.

J. MACKEY reviews 45 papers (mostly from North America) bearing on breeding for resistance to black rust. In Sweden the barberry is of paramount importance in the overwintering of the pathogen, and its eradication, therefore, appears to be a more rational method of control than breeding for resistance, though the latter should not be neglected.

J. MACKEY reports varietal differences in black rust infection at Svalöf (pp. 101–109), while information on the same subject from the Kalmar branch station is supplied by O. HOLMGREN (pp. 110–113), from Östergötland by I. WÅLSTEDT (pp. 114–131), from Västgöta by E. WALLER (pp. 132–141), and from Värmland by N. V. TORPE (pp. 142–145). A close correlation between the degree of infection and yield reduction was uniformly observed, the yield averaging about one-fifth and one-half the normal in winter and spring wheat, respectively. Only one winter selection, 01460, showed adequate resistance, but the prospects for the spring varieties were more hopeful. For instance, crosses including Thatcher [ibid., 31, p. 277; 32, p. 224] and Double Cross among their progenitors proved to be highly resistant, indicating the efficiency of the Jumillo factor under the conditions prevailing in 1951. Liberal applications of nitrogen to the soil did not enhance susceptibility to *P. graminis* provided the nutrients were well balanced and the stand was dense and even.

In a concluding general summary of the situation, Å. ÅKERMAN and J. MACKEY (pp. 146–149) find convincing evidence, in the uniformity of the picture throughout the country, for the supposition that the epiphytotic was caused by a single physiologic race or race mixture identical with that prevailing in former years. The measure of resistance of an assortment of 14 winter and 13 spring varieties is portrayed by means of two criteria, one recording the percentage of straw area occupied by rust pustules and the other the yield decrease consequent on infection.

These independent methods of computation showed a high correlation except in respect of the precocity factor, early varieties tending to greater tolerance of an equal degree of infection than those maturing later. An essential of future plans for the increase of resistance through breeding is a provision for greenhouse inoculation experiments.

Gokhale (V. P.) & Patil (B. P.). **Occurrence of a new race (No. 122) of Puccinia graminis tritici in Bombay State.**—*Curr. Sci.*, 21, 9, p. 250, 1952.

During tests at the Wheat Rust Station, Mahabaleshwar, India, type-4 infection of *Puccinia graminis tritici* [*R.A.M.*, 32, p. 179] was observed on a Yalta wheat sample from Bagalkot, collected in January, 1952, and a new race was suspected. The reactions of the twelve differential varieties [ibid., 24, p. 272] to it resembled closely those obtained with race 122, Reliance being susceptible and Kota immune. In resistance tests the varieties Charter, Gabo, Gaza, I.36.32.13.2.1.2, and C. 14112 were all resistant to the new race. Strain 88, almost immune from other races, showed infection types 1 and 2 and E.220 types 2 and 3.

Holton (C. S.) & Jackson (T. L.). **Results from tests for the control of dwarf bunt by applying fungicides to infested soil.**—*Plant Dis. Reptr*, 36, 11, p. 423, 1952. [Multilithed.]

In trials conducted by the U.S. Bureau of Plant Industry, Division of Cereal Crops and Diseases, in co-operation with Washington Agricultural Experiment Stations, for the control of dwarf bunt [*Tilletia brevifaciens*: *R.A.M.*, 32, pp. 15, 240, 257] of winter wheat by soil disinfection in five different localities in the Pacific Northwest, fungicidal dusts mixed with equal amounts of pumicite or talc were applied to the drills with the seed. Only anticarie (200 lb. diluted dust per acre) gave a significant control, with 2 per cent. infection on the variety Golden and none on Elgin, both in Idaho, and 0·7 on Rio in Washington, compared with 32, 48, and 11 per cent., respectively, for the same varieties in untreated soil.

Leukel (R. W.). **Co-operative tests with fungicides for smut control in Wheat and Oats in 1952.**—*Plant Dis. Reptr*, 36, 11, pp. 428–433, 1952. [Multilithed.]

In the 1952 co-operative seed treatment tests [cf. *R.A.M.*, 31, p. 177 and next abstract] in the United States and Alaska 14 fungicides were tested for the control of wheat bunt [*Tilletia caries* and *T. foetida*: cf. ibid., 32, p. 241] on artificially infected Ulka wheat at seven stations and 11 fungicides for the control of oat smuts [*Ustilago avenae* and *U. kolleri*: ibid., 31, pp. 392, 545] on naturally infected Canadian oats at nine stations. Anticarie slurry and dust (both at ½oz. per bush.), 275 D dust (2), ceresan M slurry (½), mycon (7·7 per cent. methyl arsenic sulphide dust, 2), tag 331 liquid (½), setrete (7 per cent. phenyl mercuric ammonium acetate liquid, ½), panogen liquid (¾), and M.E.M.A. (4 per cent. mercury in an organic mercuric compound, liquid, ½) gave less than 0·5 per cent. average bunt infection as against 28 to 30 per cent. for the untreated. Only ceresan M slurry (½), panogen liquid (¾), and mycon dust (2) gave complete control of oat smuts. None of the treatments, with the possible exception of mergamma dust (2), depressed germination of Ulka wheat in steamed uninoculated soil; in nonsteamed soil inoculated with *Fusarium graminearum* [*Gibberella zeae*: ibid., 31, p. 392] and *F. culmorum* [ibid., 29, p. 499; 32, p. 178] emergence was improved by all the treatments except mergamma, N.P. 697, and anticarie.

In trials at Gainesville, Florida, for the control of *Helminthosporium* [*Pyrenophora*] *avenae* [ibid., 29, p. 499; 31, p. 596] and *H. sativum* [ibid., 29, p. 361] in Southland oats seed treatment with ceresan M and panogen (concentrated and dilute) reduced the amount of infection from 83·9 to 5·7, 12·4, and 11·8 per cent., respectively.

Holton (C. S.) & Woo (J. Y.). **Seed-treatment tests for bunt control in winter and spring Wheats in 1952.**—*Plant Dis. Reptr*, 36, 11, pp. 424–425, 1952. [Multilithed.]

Triumph winter and Red Bobs spring wheat seed inoculated with spores of bunt [*Tilletia caries* and *T. foetida*: *R.A.M.*, 31, p. 545; 32, pp. 15, 73, and preceding abstract] was treated with 19 fungicides in two trials at Pullman, Washington, in 1951–2. Complete control was obtained on both varieties with anticarie slurry and dust and ceresan M slurry (both at ½oz. per bush.); on Triumph with copper carbonate slurry (3) plus methocel sticker, agrox slurry (½), liquid panogen containing 1·5, 1·7, and 2 per cent. mercury (¾), 60 and 24 per cent. hexachlorobenzene (H.C.B.) dust (½), 50 per cent. BHC plus 25 per cent. H.C.B. dust (1), M.E.M.A. liquid (½), and mergamma slurry (2); and on Red Bobs with mycon slurry (½), setrete liquid (½), mergamma slurry (1¾), tritisan dust (2), brassicol dust (2), merculine liquid (½), panogen liquid (¾), and agrox slurry (½) plus 0·25, 0·75, 1, or 1·5 per cent. methocel. The percentage of bunt in Triumph plants from untreated seed ranged from 43 to 50 and in Red Bobs from 66 to 67.

Andersen (A. L.). **Development of Wheat headblight incited by Helminthosporium sativum.**—*Phytopathology*, 42, 8, pp. 453–456, 1 graph, 1952.

In a study at the Michigan State College, East Lansing, on cultures of *Helminthosporium sativum* obtained from Minnesota, mycelial growth and conidial germination [*R.A.M.*, 28, p. 14] occurred from 4° to 36° C., with an optimum at 28°. Sporulation was most profuse at 24° to 28° and did not occur below 16° or above 28°. Susceptibility to head blight increased from the flowering stage onwards, especially at temperatures between 25° and 30°. At this range 12 hours' exposure to continuous wetness resulted in plant infection and 36 hours in killing of the spikelets. Visible symptoms developed within 1½ days after inoculation on plants at 25° exposed to continuous wetness, but the period was longer at lower temperatures and with shorter wetting periods.

Nishikado (Y.), Takahashi (R.), & Hiura (U.). **Studies on the disease resistance in Barley I. Varietal differences in resistance to powdery mildew, Erysiphe graminis D.C. f. hordei Marchal.**—*Ber. Ōhara Inst.*, 9, 4, pp. 411–423, 1951. [Received 1952.]

Although barley in Japan is seldom damaged by *Erysiphe graminis* f. *hordei* [*R.A.M.*, 8, p. 433; 32, p. 180] to any great extent, the disease is favoured by climatic conditions such as those which prevailed throughout western Japan during the warm winter of 1949, when it was found that spraying alone did not check an epidemic satisfactorily. Accordingly 807 barley varieties from various parts of the world were tested in the greenhouse by shaking a heavily mildewed plant over the seedlings.

Most of the resistant varieties [ibid., 31, p. 324] came from the northern Tōhoku regions of Japan and from Europe and America. Those highly resistant or immune were the Japanese varieties Hokudai No. 1 (Chevalier × Golden Melon), Chevalier (two-rowed), Date No. 2, Moravia (originally from Czechoslovakia), Miyagi No. 123 (*Hordeum spontaneum* × Koshimaki), Shidabun No. 1, Yuki-shirazu, Sangatsu, Wase Golden Melon, Hakata No. 2, Golden Melon, A-type Chevalier (six-rowed), and Golden Melon (Ibaragi); the Manchurian varieties No. 1703–1 and No. 4887–3; H.E.S. No. 4 (type 12) from south-eastern Asia; the European or American varieties Bethges & Olze St. XIII, Hadostreng, Weichenstephaner Nos. 1 and 2, German Golden, Binder, Maja, Opal, Sulton, Chevalier, Chilean Chevalier, Manmuth, Trebi No. 4; the Russian varieties Nos. 8 and 36; and the wild *Hordeum spontaneum nigrum* [ibid., 31, p. 379], *H. spontaneum* No. 6586 (Afghanistan), and *H. murinum* O(regon). Since the local varieties from eastern Asia have little or no resistance to

mildew, those mentioned above probably originated from other countries. However, the resistant character can be introduced into susceptible eastern Asiatic varieties suitable for central and southern Japan. Resistance appears to be restricted to hulled barley.

Stanton (T. R.) & Coffman (F. A.). **Winter Oats for the south.**—*Fmrs' Bull. U.S. Dep. Agric.* 2037, pp. 1–19, 8 figs., 1951.

This revision of *Bulletin* 1947 on disease-resistant and hardy oats for the South contains a list of oat varieties resistant to Victoria blight (*Helminthosporium victoriae*) [see below, p. 310], crown rust (*Puccinia coronata*) [loc. cit.], and smuts [*Ustilago avenae* and *U. kolleri*: *R.A.M.*, 32, p. 248], and the States for which they are recommended. Among the varieties mentioned Marett Winter Resistant, distributed since 1938 and grown mainly in the Piedmont and Mountain sections of South Carolina, is resistant to certain races of smuts.

McKay (R.). **Failures in Oats due to root rot caused by Gibberella zeae.**—*Sci. Proc. R. Dublin Soc.*, N.S., 26, 2, pp. 55–62, 1 pl., 1952.

In this account of failures in oat crops in Ireland during 1951 caused by severe attacks of *Gibberella zeae* [cf. *R.A.M.*, 31, p. 593] the author states that the general appearance of the disease in the field simulated severe attacks of *Ophiobolus graminis*, the dead and dying plants being from 6 to 20 in. high with many culms blackened at the base. This discoloration resulted from an abundant development of the perithecia [ibid., 28, p. 619]. Ascospores were released before the end of June. Of the six fields affected, five were sown with Black Tartary and one with the white variety, Victory; in the former from 30 to 90 per cent. of the plants were infected. Maximum intensity occurred on part of one field which was not ploughed but only disk-harrowed. Total yields at harvest from three of the affected fields were reduced by approximately 41, 20, and 44 per cent., respectively, 20 cwt. of oats being taken as an average yield per acre. In five of the fields the soil pH varied from 5 to 5·2 and in the sixth the weed flora indicated an acid soil also.

Prasada (R.) & Tandon (I. N.). **Leaf spot disease of Oats and its control.**—*Indian Phytopath.*, 3, 1, pp. 87–94, 1950. [Received March, 1953.]

This information concerning the control of *Pyrenophora avenae* on oats in India has already been noticed in a shorter form from another source [*R.A.M.*, 31, p. 539].

Rosen (H. R.) & York (J. O.). **Arkwin, a new winter pasture Oat for Arkansas.**—*Arkans. Fm Res.*, 1, 2, p. 4, 1952. [Abs. in *Herb. Abstr.*, 23, 1, p. 26, 1953.]

The new oat variety Arkwin combines good winter-hardiness with resistance to *Helminthosporium* blight [? *Pyrenophora avenae*: *R.A.M.*, 31, p. 601.]

Nattrass (R. M.). **Occurrence of Puccinia polysora Underw. in East Africa.**—*Nature, Lond.*, 171, 4351, p. 527, 1953.

Very severe attacks of maize rust (*Puccinia polysora*) [*R.A.M.*, 31, p. 325] were observed in June, 1952, in the Coast Province of Kenya. Both uredo and teleuto stages were present, this being the first record of the latter outside America. Collections were also obtained from Zanzibar, Uganda, and Tanganyika, where both *P. polysora* and *P. sorghi* [loc. cit.] were found on the same leaf. All records of severe attacks of *P. polysora* are from the warmer, more humid areas, the Kenya Highlands so far remaining free.

Leukel (R. W.) & Webster (O. J.). **Seed treatment tests on Sorghum in 1952.**—*Plant Dis. Reptr*, 36, 11, pp. 426–427, 1952. [Multilithed.]

In the 1952 sorghum seed treatment tests [cf. *R.A.M.*, 31, p. 181] carried out at Beltsville, Maryland, and Lincoln, Nebraska, none of the 12 fungicides tested reduced emergence of Sharon Kafir in steamed soil. All of them improved it in soil infested with [unspecified] pathogenic fungi, the increases ranging from 23 to 41 per cent. In dust form arasan, phygon, mycon, orthocide, 5202 K (all at 2 oz. per bush.), and ceresan M (0·5), the slurries arasan S.F.K., phygon, and 5202 K (all at 2 oz.), and liquid vancide 51 (4 oz.) and 5025-S (2) all gave complete control of covered smut [*Sphacelotheca sorghi*: loc. cit.], the untreated having averages of 57 and 36 per cent. infection at the two stations, respectively.

Research work and workers.—*Seed World*, 72, 2, pp. 40–41, 1953.

The famous Navel orange tree brought from Brazil to Riverside, California, in 1870 and from which most of the Navel trees there are descended was attacked by 'ground' rot gummosis [*Phytophthora* spp.: see next abstract]. In order to save the tree new roots were gradually grafted on and it was completely cured.

The introduction of the Southland oat variety resistant to Victoria blight [*Helminthosporium victoriae*: ibid., 32, p. 177 and above, p. 309] resulted in over 1,000,000 bush. increase in yield in Florida in 1952. Floriland oat, resistant to the races of crown rust [*Puccinia coronata*: loc. cit.] that attack Southland, has recently been released by the Florida Experiment Station.

Halma (F. F.) & Opitz (K. W.). **Observation on foot rot of Orange in California.**—*Plant Dis. Reptr*, 36, 11, p. 413, 1 fig., 1952. [Multilithed.]

None of the Navel orange budlings on sweet orange stocks and none of the Valencia cuttings or budlings in a plot at Porterville, Tulare County, California, have shown signs of foot rot (*Phytophthora citrophthora*) [*R.A.M.*, 26, p. 242; 30, p. 464 and preceding abstract], which affected 11 of the 12 Navel cuttings interplanted with the Navel budlings. It is suggested that the fungus penetrates Navel bark more easily than that of Valencia or the sweet orange rootstocks. This view is supported by the high incidence of foot rot on Navel cuttings at the East Highlands Orange Company, San Bernadino County, where losses of Valencia cuttings growing under similar conditions were negligible.

Mildura District Horticultural Field Day.—*J. Dep. Agric. Vict.*, 51, 1, pp. 15–18, 22, 4 figs., 1953.

The 1952 storage experiments with navel oranges grown in the Mildura district of Victoria were designed mainly to confirm previous results concerning the factors affecting the development of green and blue *Penicillium* moulds [*P. digitatum* and *P. italicum*: *R.A.M.*, 23, p. 104; 29, p. 98].

Contrary to the results of previous years spraying the trees with oil did not increase mould wastage as compared with fumigation. Wastage was not reduced appreciably by sweating the fruit prior to packing. A pre-storage dip in 1 volume brytene [cf. ibid., 26, p. 17] in 3 volumes water plus 4 per cent. borax and 2 per cent. boric acid gave very effective protection for two months, the optimum storage life, but after that its efficiency declined. The percentage mould losses after two months were as follows: (*a*) fruit fumigated and dipped 6, (*b*) oil-sprayed and dipped 2, (*c*) fumigated, dipped, and sweated 4, (*d*) oil-sprayed, dipped, and sweated 5, and (*e*) fumigated and diphenyl-wrapped [ibid., 31, p. 603] 2, while for all the other treatments which did not include dipping losses exceeded 10 per cent. There was little difference between the effectiveness of diphenyl wrapping and the fungicidal dip during two months' storage.

Although oranges picked from the bottom of trees showing mouldy fruit tended to develop more mould than those picked from near the top of the same trees, the results demonstrated clearly that oranges from trees quite free from mould at picking time may suffer high mould wastage during storage.

ELAZARI-VOLCANI (ZAPHRIRA). **A comparative study of the pathogenicity of two isolates of Pseudomonas syringae.**—*Ktavim* (*Rec. agric. Res. Sta., Rehovot*), 1, pp. 49–50, 1950. [Abridged translation from the Hebrew text (pp. 211–231, 12 figs.). Received 1953.]

The comparative pathogenicity of two isolates of *Pseudomonas syringae* from avocado and lemon fruits, respectively, was studied over a wide host range by inoculation. Both isolates caused similar characteristic lesions on all the inoculated material, except apricot fruits and peach and plum leaves, and the avocado strain caused no infection on apples or the petioles or twigs of orange, grapefruit, or lemon. When the temperature was varied, however, the two isolates had different effects on the various hosts, and the temperature favouring maximum lesion development on each host was not always identical for both isolates. Thus, for the avocado isolate it was 25° to 30° C. on avocado, tomato, peach, plum, and pear fruits; 12° to 23° on citrus fruits, avocado leaves, and pods of pea and bean [*Phaseolus vulgaris*]; and 15° and 24° to 25° on horse-bean [*Vicia faba*] pods. With the lemon isolate the figures were: 18° to 20° for lemon, grapefruit, orange, peach, apple, and pear fruits, and avocado leaves; 20° to 25° for citrus twigs and petioles, tomato fruits, pea and horse-bean pods; 25° to 30° for avocado and plum fruits; and 12° to 13° for bean pods.

There were no differences in size between the colonies of the two isolates in culture at different temperatures, the optimum for both being 28·5°. No correlation was established between the growth rate of the two isolates on nutrient agar and the size-increase of the pathogenic lesions under varying temperature conditions.

SCHNEIDER (Y. I.). Применение хлорокиси меди для борьбы с бактериальным некрозом Цитрусовых. [The application of oxychloride of copper to the control of bacterial necrosis of Citrus.]—Сад и Огород [*Orchard & Garden*], *1952*, 3, p. 28, 1952.

Field tests on the control of citrus bacterial necrosis [? *Pseudomonas syringae*: *R.A.M.*, 32, p. 140], which is causing serious damage to citrus trees in Adzharia and Houri, U.S.S.R., were carried out in December, 1950, and March, 1951, on the Tzihis-Dziri State Farm. After two applications of 0·5 per cent. copper oxychloride followed by spring pruning of the diseased year-old twigs only 8 per cent. of the trees were severely infected, the same as for 1 per cent. Bordeaux mixture, compared with 38 per cent. for the untreated. One application only (in March) was not as effective as two, but the average number of diseased trees was reduced by 15 per cent. and heavily infected ones by 8·1 per cent. Copper oxychloride appears to be a very promising chemical, but further trials are required before it can be used commercially.

HEALY (W. B.). **Note on zinc deficiency of Citrus at Aitutaki, Cook Islands.**—*N.Z.J. Sci. Tech.*, Sect. *A*, 34, 2, pp. 228–229, 1 fig., 1952.

Chlorosis of orange trees due to zinc deficiency [*R.A.M.*, 24, pp. 6, 16; 30, p. 414; 32, p. 184] was first noticed at Aitutaki, Cook Islands, in 1949. Sprays containing zinc sulphate were the only trace element application that improved the condition. Analyses showed that the trees contained only 7·1 p.p.m. zinc.

Darcel (F. C.). **A review of recent investigations on Citrus production, with particular reference to the mineral nutrition of the crop.**—*Trop. Agriculture, Trin.*, 29, 4–6, pp. 77–87, 1952.

The author gives a review (with 41 references) of the work done during the last 20 years on citrus cultivation in relation to soils [*R.A.M.*, 30, p. 365], soil moisture [ibid., 30, p. 267], and mineral fertilizers [ibid., 31, pp. 237, 383; 32, p. 18] in different parts of the world and describes the diseases associated with these features, particularly in relation to mineral deficiencies [see preceding abstract].

Lehman (S. G.). **Dusting tests for control of fungus damage to seed Cotton in North Carolina in 1951.**—*Plant Dis. Reptr*, 36, 11, pp. 414–415, 1952. [Multilithed.]

In two dusting tests for the control of 'fungus tight lock' of cotton bolls [*Diplodia gossypina* and *Glomerella gossypii*: *R.A.M.*, 31, p. 326] carried out in North Carolina in 1951, none of the fungicides used reduced fungal invasion, which occurred mainly through insect injuries, indicating that elimination of insect damage would be more effective as a control measure.

Wiles (A. B.). **A seedling inoculation technique for testing Cotton varieties for resistance to Verticillium wilt.**—Abs. in *Phytopathology*, 42, 5, p. 288, 1952.

The resistance of cotton varieties to *Verticillium albo-atrum* [*R.A.M.*, 32, p. 67; cf. next abstract] has been tested as follows. Seed flats filled with sandy loam soil were fumigated with methyl bromide before sowing. The seedlings were inoculated in the four-leaf stage by dipping the roots in a suspension of the fungus grown in Czapek's solution, passed through a Waring Blendor, and sufficient agar added to give a thick consistency. Seven to eight days after inoculation wilting developed, followed by yellowing and shedding of the leaves. The pathogen was isolated from the brown vascular tissues of diseased plants. Many of the seedlings died during the next four weeks while others were severely stunted. Those showing slight or no symptoms were considered resistant or tolerant. The same procedure is applicable to the evaluation of resistance in cotton to *Fusarium* [*vasinfectum*].

Rubin (B. A.) & Perevyazkina (Mme L. M.). Роль дубильных веществ в явлениях устойчивости Хлопчатника к вилту. [The role of tannic substances in the phenomena of resistance of the Cotton plant to wilt.]—Докл. Акад. Наук СССР [*C.R. Acad. Sci. U.R.S.S.*], N.S., 79, 2, pp. 303–306, 1951. [Received March, 1953.]

In studies at the Lomonosov Moscow State University, U.S.S.R., to determine the influence of tannin on cotton resistance to wilt (*Verticillium albo-atrum*) [*R.A.M.*, 17, p. 814] pot experiments were carried out with four varieties (two resistant and two susceptible) obtained from the Pan-Soviet Scientific Cotton Research Institute. The plants were infected by introducing into the pots barley grains inoculated with *V. albo-atrum*.

The results showed that in reaction to wilt significantly more tannin was produced in roots and stems of resistant varieties, its content being double that in susceptible ones, where it was barely detectable. In the leaves it was greatly reduced while it remained unchanged or somewhat increased in the leaves of the susceptible varieties. The most conspicuous tannin reaction was in the roots of the resistant plants, to which it was transported (in part) from the leaves. This concentration in the organs which are first attacked is regarded as a peculiar form of reaction, 'supersusceptibility', which constitutes the basis of resistance in higher plants. In susceptible plants tannin remains evenly distributed throughout the plant and to this is attributed its incapability of resisting infection.

All the foregoing information indicates a positive rather than a negative role of

tannin in resistance to wilt. This is further supported by the amount of diluted polyphenol in the common tannin content. In the first experiment the resistant roots contained double the amount of polyphenol [present in the uninfected plants] and in the second it was increased by 50 per cent. A similar relation was observed in the stem tissues, while in infected leaves the amount of polyphenol was reduced one and a half times in the first experiment. In susceptible plants, however, polyphenol increases were insignificant or nil.

Cotton resistance to wilt represents an active physiological process at the root of which lies the intensification of host respiration. In this case it is achieved by increasing the tannin content. This reaction in cotton, therefore, should be regarded as an important protectant, but its nature and importance for the immunity of cotton requires further study.

Drechsler (C.). **Another nematode-strangulating Dactylella and some related Hyphomycetes.**—*Mycologia*, 44, 4, pp. 533–556, 6 figs., 1952.

Descriptions are given of *Dactylella acrochaeta* n. sp., *Trichothecium polyctonum* n. sp., *D. helminthodes* n. sp., and some related hyphomycetes which capture nematodes in decaying vegetable matter [*R.A.M.*, 29, p. 304; 32, p. 125].

Duddington (C. L.). **A new species of Stylopage capturing amoebae in dung.**—*Ann. Bot., Lond.*, N.S., 17, 65, pp. 127–129, 1 fig., 1953.

A description is given of *Stylopage cymosa* n. sp. isolated from horse-dung from Kingston-on-Thames, Surrey. It captures amoebae [cf. *R.A.M.*, 30, p. 466] by means of sticky hyphae 1 to 2 μ in diameter and absorbs the contents with slender, filamentous haustoria, usually 1 μ in diameter. Up to eight rectangular-ellipsoid, hyaline, unicellular conidia measuring 12 to 21 by 6 to 10 μ are formed by sympodial branching of the conidiophores.

Lepori (L.). **Una micosi delle larve di Thaumetopea pityocampa Schiff.** [A mycosis of the larvae of *Thaumetopea pityocampa* Schiff.]—*Notiz. Malatt. Piante, 1952*, 19, pp. 77–79, 1952. [Mimeographed. English summary p. 90.]

From dead larvae of *Thaumetopea pityocampa* the author isolated *Beauveria globulifera* [*R.A.M.*, 25, p. 262] and *Oospora guerciana*. In an inoculation experiment on groups of six healthy larvae three became infected by *B. globulifera* in three days, dying between the eighth and ninth day; none was infected by *O. guerciana*; while when both fungi were used two larvae became infected by *B. globulifera* only. It is concluded that *B. globulifera* is able to attack and kill *T. pityocampa* larvae, whereas *O. guerciana* grew only on larvae already killed by some other cause.

Misra (A. P.). **Aspergillus flavus Link, a parasite of the Desert Locust (Schistocerca gregaria Forsk.).**—*Curr. Sci.*, 21, 8, p. 225, 1952.

Aspergillus flavus [see next abstract] caused the death of adult desert locusts (*Schistocerca gregaria*) [cf. *R.A.M.*, 11, p. 42; 18, p. 310] in cages at the Locust Control Laboratory, New Delhi, India, during September and October, 1951. There seems to be no previous record of its occurrence on this host in India.

Sussman (A. S.). **Studies of an insect mycosis. IV. The physiology of the host-parasite relationship of Platysamia cecropia and Aspergillus flavus.**—*Mycologia*, 44, 4, pp. 493–505, 5 graphs, 1952.

In this further paper [*R.A.M.*, 31, p. 115] on the physiological aspects of the disease caused to *Platysamia cecropia* by *Aspergillus flavus* [see preceding abstract] experiments carried out to secure a quantitative expression of virulence are

described. It was found that affected pupae undergo a 20-fold increase in oxygen uptake as a result of the infection, though a substantial part of this increase is due to host metabolism. Loss of weight of infected pupae runs roughly parallel to the respiratory increase, and most of it is due to evaporation of water through the spiracles, in contrast to healthy animals which lose water almost entirely through the integument. Up to 28° C. the rate at which weight is lost is directly proportional to the temperature.

It is suggested that quantitative studies of virulence, particularly from a genetic or physiological standpoint, could be based on respiratory exchange and weight loss during disease.

Culbertson (J. O.), Stoa (T. E.), Dunham (R. S.), Flor (H. H.), & Christensen (J. J.). **Seed-Flax production in the north central States.**—*Fmrs' Bull. U.S. Dep. Agric.* 2036, 22 pp., 7 figs., 1 graph, 1 map, 1952.

This publication (replacing *Bulletin* 1747) includes a section (pp. 18–22) on flax diseases and their control in the north-central area of the United States.

Fulton (R. W.). **Mechanical transmission and properties of Rose mosaic virus.**—*—Phytopathology*, 42, 8, pp. 413–416, 1 fig., 1952.

In this joint study by the Division of Tobacco, Medicinal, and Special Crops, U.S. Department of Agriculture, and the Wisconsin Agricultural Experiment Station on the factors determining transmissibility of the rose mosaic virus [*R.A.M.*, 20, p. 365], transmission was effected by mechanical inoculation from *Rosa setigera* to cucumber and cowpea. Cucumber developed chlorosis and necrosis and cowpea chlorotic ring spot, both ultimately being killed. From infected cowpea the virus was transmitted to 25 plant species in seven families, including *Nerium oleander*, *Vinca rosea*, *Cynara cardunculus*, watermelon, squash, vegetable marrow, bean (*Phaseolus vulgaris*) and other *P.* spp., *Crotalaria intermedia*, *Cyamopsis tetragonoloba*, *Dolichos biflorus*, strawberry, *R. multiflora*, *Nicotiana glutinosa*, *N. rustica* and other *N.* spp., and *Petunia hybrida*. Dodder and aphids failed to transmit the virus.

C. tetragonoloba was used as an assay host for local lesion counts. Undiluted sap of diseased cowpea leaves was non-infectious, and so was that diluted with 0·1 M phosphate buffer after extraction, but virulent inoculum was secured when leaves were macerated in the buffer. Such extracts lost their activity within an hour, except in the presence of a reducing agent, e.g., 0·01 M cysteine hydrochloride, which extended the longevity to six hours. Infection was prevented or substantially reduced by the incorporation of divalent metallic ions with the extracts. In unmacerated cowpea tissue the virus was inactivated by ten minutes' exposure to a temperature of 54° C. Unlike the tomato spotted wilt and potato yellow dwarf viruses, rose mosaic virus could not be preserved by drying infected tissue in a partial vacuum at 1° over a desiccant [ibid., 26, p. 327]. The addition of 2·5 to 10 per cent. healthy leaf extract to infectious extracts of cowpea leaves inactivated most of the virus.

McClellan (W. D.). **Effect of temperature on the severity of Fusarium basal rot in Narcissus.**—*Phytopathology*, 42, 8, pp. 407–412, 1 fig., 2 graphs, 1952.

At the Plant Industry Station, Beltsville, Maryland, the growth of *Fusarium oxysporum* f. *narcissi* [*F. bulbigenum*] on agar was very scanty at 35°, 45°, and 95° F. [*R.A.M.*, 11, p. 786; cf. 23, p. 133; 30, p. 230]. Roots of pre-cooled King Alfred *Narcissus* bulbs inoculated with a spore and mycelial suspension of the fungus at 85° developed symptoms of basal rot four days later, and after ten days rotting was complete. After ten days at 75° it was almost as far advanced as at

85°, whereas at 65° decay was only incipient and at 35°, 45°, and 55° no infection took place. The optimum range for the growth of non-inoculated plants was from 55° to 65°. Late-season mulches with leaves, straw, and aluminium foil failed to lower average soil temperatures sufficiently to cause a reduction in the severity of basal rot, as measured by healthy bulb yields.

In 1947 and 1949 the percentages of basal rot in King Alfred bulbs grown at Beltsville were 26·6 and 25·8, respectively, compared with 5·1 and 6·7, respectively, in similar lots sent to Puyallup, Washington, and grown there. Washington-grown bulbs contracted only a low incidence of infection in the same two years (2·7 and 5·3 per cent., respectively), which did not increase beyond 7·9 and 5·4 per cent., respectively, when comparable lots of bulbs were transferred to Beltsville. Late spring and summer temperatures at Puyallup average 8° to 12° lower than at Beltsville, and the comparative coolness of the growing season is believed to account for the lesser importance of basal rot in Washington.

Beaumont (A.). **Diseases of Lily of the Valley.**—*Gdnrs' Chron.*, Ser. 3, 133, 3454, p. 104, 1953.

Lily-of-the-valley *Botrytis* disease or 'fire' [in Great Britain], presumably caused by *B. paeoniae* [*R.A.M.*, 31, p. 491], does not affect the rhizomes, which can be transplanted without carrying the disease. Successful inoculations were obtained on lily-of-the-valley, but cross inoculations to tulip and inoculations on lily-of-the-valley with *B. tulipae* [ibid., 31, p. 479] gave negative results.

Tomlinson (J. A.). **Brown core root rot of Primula caused by Phytophthora primulae n. sp.**—*Trans. Brit. mycol. Soc.*, 35, 3, pp. 221–235, 2 pl., 5 figs., 1 graph, 1952.

In May, 1949, diseased plants of polyanthus (*Primula polyantha*) and *Primula* sp. were received at the Plant Pathology Laboratory, Harpenden, Herts., from Lewes, Sussex. Later in the same month polyanthus plants showing similar symptoms were received from Cornwall. In May, 1950, the disease was again found in Cornwall and also in Hertfordshire, Warwickshire, and Northumberland, and in 1951 it was observed in Buckinghamshire, Hampshire, and Essex.

The symptoms closely resemble those of strawberry red core (*Phytophthora fragariae*) [*R.A.M.*, 19, p. 608]. The plants are dwarfed, the leaves wilt and collapse in succession from the outside to the centre of the rosette, and the root system is poorly developed with a conspicuous absence of fine laterals. Some main roots decay backwards from the tip and there is a brown axial discoloration, hence the name brown core. In early stages the roots may be healthy except for partial or general watersoaking and decay of the laterals or partial root discoloration.

Old infected roots contained oospores (10 to 26 μ in diameter) of a *Pythium* identified as *P. aphanidermatum* and of an unknown *Phytophthora* (23 to 33 μ); both were constantly isolated from moderately affected roots.

Typical brown core symptoms were produced in potted polyanthus plants inoculated with agar disks of mycelium or a zoospore suspension of the *Phytophthora*; it was reisolated successfully six times out of eight. The results with *Pythium aphanidermatum* were negative. *Primula denticulata*, *P. wanda*, and cowslip (*P. veris*) appeared to be resistant. Primrose (*P. vulgaris*) developed typical symptoms. The causal fungus was also pathogenic to and reisolated successfully from apple fruits of the varieties Beauty of Bath, Duchess of Oldenbergh, Lady Sudeley, Red Astrakhan, and Worcester Pearmain, and tomato plants (Early Market and Harbinger), Ailsa Craig and Spanish White onion, and Huxley and wild strawberry. Inoculations to polyanthus with *Phytophthora fragariae* were negative.

The polyanthus isolate most nearly resembled *P. syringae* [loc. cit.] but differed in having larger sporangia (33 to 165 by 23 to 52 μ, average 77 by 34 μ), obtained

on bean agar disks in constantly aerated soil extract solution, also compound sporangia hitherto unknown in this genus. The presence of occasional amphigynous antherida in *P. syringae* was also considered to be a distinguishing feature. Comparisons with sixteen other *Phytophthora* species also showed it to be distinct. The polyanthus isolate is therefore designated *P. primulae* n. sp. with the following characteristics. The sporangiophores are 10 to 500 μ long and the catenulate compound sporangia with an inconspicuous papilla consisting of two to eleven spherical or irregular sporangial segments, 100 to 351 by 6 to 36 μ. The zoospores measure 10 to 15 μ, the terminal or lateral, globose oogonia 23 to 43 (average 37) μ in diameter, the paragynous antheridia mostly 14 to 18 μ in diameter, and the spherical oospores, hyaline when young and sometimes pale yellow when old, 17 to 33 (average 30) μ in diameter with a smooth wall 3 μ thick.

In neither *Primula* brown core nor strawberry red core could direct infection of the main roots be traced. In both cases infection appeared to originate in the laterals. Another analogy is the wilting and collapse of plants in late spring. Field attacks of brown core were found to have originated in the seedling boxes, the fungus probably having been carried over during planting operations in soil adhering to the roots or in roots of slightly affected young plants.

In preliminary control experiments with soil fungicides thiram showed some promise. Further precautions include making nursery compost from clean soil, sterilizing the soil in infected nurseries, and avoiding planting seedlings in soil where the disease has occurred.

Gualaccini (F.). **'Mal bianco' del Lillà (Syringa vulgaris L.).** [Powdery mildew of Lilac (*Syringa vulgaris* L.).]—*Boll. Staz. Pat. veg. Roma.* Ser. 3, 7 (*1949*), pp. 199–203, 1951. [English summary.]

After recording an unidentified powdery mildew on lilac near Rome, the author briefly summarizes the literature on the fungi causing the disease in Europe and America [? *Oidium syringae*: cf. *R.A.M.*, 31, p. 552].

Rust of Snapdragons.—*J. Dep. Agric. Vict.*, 51, 1, p. 9, 1953.

Antirrhinum rust [*Puccinia antirrhini*: C.M.I. map No. 40] was recently reported to be present in Australia in the Sydney area. As there is evidence that it was introduced in seed imported from Germany, all imported seed in future will have to be examined by a pathologist before being cleared. Seed treatment is recommended.

Brierley (P.) & Smith (F. F.). **A ringspot virus from Hydrangea infectious to herbaceous plants.**—*Plant Dis. Reptr*, 36, 10, pp. 382–383, 1952. [Multilithed.]

Hydrangea diseases suspected to be of virus origin [cf. *R.A.M.*, 30, p. 601] include a die-back with brown, canker-like stem lesions and chlorosis and rugosity of the leaves, transmissible by grafting to healthy plants. The symptoms occurred in eastern Pennsylvania in 1947, no further outbreaks having been recorded. In May, 1952, a rugose mosaic was observed on the Strafford variety in North Carolina. The plants bore small, poorly developed flowers and stiff, rugose, mottled leaves. The virus was transmitted by sap inoculation to Samsun tobacco on which a systemic ring spot developed; no symptoms occurred on the upper leaves though the virus was demonstrated to be present in them by subtransfer. On the cucumber varieties A. and C. primary yellow spots appeared after five days, a systemic yellow vein mosaic in seven, mild yellowish mottling in 18, and the plants recovered in 20 days; *Zinnia* showed systemic yellow vein mosaic after six days and recovery after 14; China aster developed systemic yellow mottle after 11 days and a local brown line etch pattern after 18; and though no symptoms were detected on

snapdragon [*Antirrhinum majus*] infection was demonstrated by inoculation to tobacco. The virus failed to protect tobacco from tobacco ring spot virus and *Zinnia* from cucumber mosaic virus.

Pryanishnikova (Mme Z. D.). Нарушения проводящей системы у Подсолнечника при отсутствии бора [Destruction of the conducting system of Sunflowers in the absence of boron.]—Докл. Акад. Наук СССР [*C.R. Acad. Sci. U.R.S.S.*], N.S., 78, 5, pp. 1029–1032, 4 figs., 1951. [Received March, 1953.]

Laboratory experiments at the Moscow Timiryazev Academy of Agriculture, U.S.S.R., on the influence of boron deficiency in sunflower [*R.A.M.*, 24, p. 5] have shown that it results in the destruction of the conducting system, beginning apparently with the differentiation of the vessels from the cambium. Plants not receiving boron were dwarfed, their tops killed, and the stems weak and slender. The plants survived for quite a long time but were never more than 15 cm. high. The difference between deficient and normal plants was most striking in the conducting tissues of the upper leaves and the stem tip.

Fischer (G. W.). **Evidence of complex physiological heterothallism in Ustilago striiformis hordei.**—*Res. Stud. St. Coll. Wash.*, 21, 1, pp. 57–72, 1953.

The sexuality of *Ustilago striiformis* var. *hordei* [cf. *R.A.M.*, 19, p. 351; 31, p. 72] was studied at Washington Agricultural Experiment Station from 261 monosporidial cultures from a total of 38 germinating spores representing 24 smut collections from *Agropyron* and *Elymus* spp. Only two compatibility groups could be detected from any one germinating spore and sometimes only one. When 46 of these cultures were mated in all possible combinations on plain water agar six compatibility groups were demonstrated, each being compatible with two others. When mated with 23 monosporidial cultures of *U. bullata* [ibid., 31, p. 60; 32, p. 22] from four collections representing three pathogenic races they maintained their compatibility group identity. *U. bullata* exhibited three compatibility groups, (i) compatible with A, C, and E, and (ii) with B, D, and F of *U. striiformis* var. *hordei*, and (iii) not compatible with any of the stripe smut cultures.

It is noted in the conclusion that although these studies and earlier ones by others deal with sexual reproduction, the various sex groups in the different species should not be designated as 'sexes' in the sense of male and female but rather be considered as compatibility groups or mating types.

Boerger (A.). **Obtención en la Estanzuela de un Lolium multiflorum resistente a Schizozaphis graminum y Puccinia coronata.** [A strain of *Lolium multiflorum* resistant to *Schizozaphis graminum* and *Puccinia coronata* developed at La Estanzuela.]—*Arch. fitotéc. Uruguay*, 5, 1, pp. 155–156, 1952. [English summary p. 178.]

A short account is given of the breeding in Uruguay of the Italian ryegrass (*Lolium multiflorum*) strain Raygrass La Estanzuela 284 which was highly resistant to *Puccinia coronata* in trials carried out in the United States.

Hyde (E. O. C.). **Methods for determining the viability of various seeds by tetrazolium staining. II. Perennial Ryegrass.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 2, pp. 195–201, 3 figs., 1 graph, 1952.

A quick method for determining the viability of perennial ryegrass (*Lolium perenne*) seed consists in presoaking a sample for 16 hours at 30° C., sterilizing with calcium hypochlorite, bisecting, and steeping in 1 per cent. 2, 3, 5-triphenyltetrazolium bromide for six hours at 30° C. Almost all the seeds on which symptoms of blind seed disease [*Phialea temulenta*: *R.A.M.*, 24, p. 316; 32, p. 21] were

perceptible at low magnification had unstained embryos, while those of disease-free seeds were stained partially or completely.

NEILL (J. C.). **Note on agronomic effect of the endophyte of Lolium perenne.**— *N.Z. J. Sci. Tech.*, Sect. A, 34, 2, p. 230, 1952.

In trials at the Grasslands Division, Department of Scientific and Industrial Research, Palmerston North, New Zealand, to compare *Lolium perenne* plants infected with and free from an endophyte [? *Endoconidium temulentum*: *R.A.M.*, 22, p. 139], neither the vigour nor the palatability of the grass was altered by infection.

WEBSTER (J.). **Graminicolous Pyrenomycetes. IV. Microthyrium nigro-annulatum n. sp. and M. gramineum.**— *Trans. Brit. mycol. Soc.*, 35, 3, pp. 208–214, 3 figs., 1952.

In a further study in this series [cf. *R.A.M.*, 31, p. 89] carried out in the Department of Botany, University of Sheffield, *Microthyrium nigro-annulatum* n. sp. is described as occurring on the stems and leaf sheaths of *Dactylis glomerata*. It is characterized by scattered, greyish-black thyriothecia with smooth margins 54 by 90 μ in diameter; the ostiole is surrounded by a ring of small cells with thick black walls, which frequently turn outwards to form a rim; the sessile, obclavate asci measure 20 to 26 by 6 to 8 μ; the tapering, hyaline ascospores, generally with a single transverse septum, are 6·5 to 10·5 by 1·5 to 2·5 μ. The fungus is compared with *M. gramineum*.

GERDEMANN (J. W.). **The effect of temperature on the results of seed treatment of small-seeded legumes.**—*Plant Dis. Reptr*, 36, 11, p. 419, 1952. [Multilithed.]

At the Department of Agronomy, University of Illinois, Urbana, red clover seeds were sown in warm (70° to 75° F.) and cold (45° to 55°) soil, which had previously been sterilized and then infested with a pathogenic *Pythium* sp. [*R.A.M.*, 32, p. 22]. Pre-emergence damping-off was more severe in warm than in cold soil, mean emergence percentages being 14·3 and 59·7, respectively, for untreated seed and 24·5 and 59·5, respectively, for that treated with 0·5 per cent. arasan, which exerted partial control in the warm soil [ibid., 30, p. 273].

MINYAEVA (Mme O. M.). О распространении антракноза Клевера с семенами. [Dissemination of Clover anthracnose with seeds.]—Бюлл. Моск. Общ. Исп. Природи [*Bull. Soc. Nat. Moscow*], N.S., 56, 5, pp. 91–95, 1951. [Received April, 1953.]

In investigations of the dissemination of clover anthracnose (*Kabatiella caulivora*) in the U.S.S.R. [*R.A.M.*, 18, p. 600] tests showed that the virulence of spores on the seed surface was significantly decreased when the storage period was lengthened. Thus after nine months' storage an average of 0·28 per cent. seed contamination was detected as against 92·5 per cent. at the beginning of the period and the former seeds gave healthy plants [cf. ibid., 7, p. 583]. Clover seeds sown in sterilized soil immediately after inoculation gave rise to 16·9 per cent. infected seedlings; those sown on damp filter paper gave 30·7 per cent. infected plants though 87·5 per cent. of the seeds developed fungus colonies on the surface.

Infected plant debris on the seed surface is also a possible source of infection, rain splashes assisting dissemination. This occurred when boxes with clover seeds, previously well mixed with diseased tissues of infected plants, were kept in the plant house. Hygienic treatment, cleaning, and drying of the seed are, therefore, essential as a preventive measure.

Seeds from infected plants bore spots characteristic of anthracnose infection on

the seed coat and were usually poorly developed, this being the only indication that the seed was infected. On spotted seeds, however, no spore germination occurred either in a damp room or on media and no mycelia were observed. Only a small percentage (not more than 1·89) of fungus colonies arose from poorly developed seeds grown on nutrient media. Infected seeds (mainly the larger ones) pass the threshing and are used for sowing, thus serving as sources of infection.

It is concluded from the biological study of *K. caulivora* that in nature the disease can be seed transmitted [cf. ibid., 13, p. 520] by various means.

Battle (W. R.). **The effect of advance in generation and age of stand on bacterial wilt reaction of Atlantic Alfalfa.**—*Agron. J.*, 44, 10, pp. 602–605, 1 graph, 1952.

In 12 lots of Atlantic lucerne tested for their reaction to bacterial wilt [*Corynebacterium insidiosum*: *R.A.M.*, 32, p. 193] at the New Jersey Agricultural Experiment Station, no significant changes in reaction were attributed to advance in generation or growth outside the primary area of adaptation (Utah and California). On the other hand, a significant change did result from the action of natural selection on an ageing stand, the seed of surviving plants being much more resistant to the disease than the parental material. The evidence indicates that lucerne varieties with a wide gene base may be propagated for three or four generations from the parent material with no marked change in wilt reaction. Seed fields must be replaced with new material as soon as the stands are appreciably thinned if the original varietal characters are to be retained.

Troll (H.-J.). **Viren, deren Schäden und genetische Resistenzfragen bei Lupinus luteus.** [Viruses, the damage they cause, and questions of resistance in *Lupinus luteus*.]—*Züchter*, 22, 6, pp. 164–175, 10 figs., 2 graphs, 1952.

A brief review of the literature on lupin mosaic virus and cucumber mosaic virus on lupin is followed by a comprehensive, tabulated account of the author's studies in 1951 at the Plant Breeding Institute, Müncheberg, Mark, Germany [cf. *R.A.M.*, 18, pp. 509, 803], on the symptoms and diagnostic characters of infection at different stages in the growth of Portuguese wild yellow lupins and their hybrid progenies.

Damage from the viruses in three genetically comparable single-plant progenies of strain 102 (with the lowest alkaloid content of the recognized strains) was assessed at up to 80 per cent. Definite germination and emergence injury occurred with seed from infected plants of the Weiko III variety. The incidence of the virus increased with delay in the sowing date, irrespective of the alkaloid contents of the different varieties. In a summer sowing test (27th July) the bitter Portuguese wild form uniformly contracted heavy lupin mosaic and slight cucumber mosaic infection, whereas the hybrid progeny of Portuguese × sweet lupin were almost equally susceptible to both viruses.

Keitt (G. W.). **Inheritance of pathogenicity in Venturia inaequalis (Cke) Wint.**—*Amer. Nat.*, 86, 831, pp. 373–390, 10 figs., 1952.

In this summary of the investigations carried out at the University of Wisconsin, Madison, on the inheritance of pathogenicity in the apple scab fungus (*Venturia inaequalis*) [*R.A.M.*, 27, p. 480] the materials used and methods developed and their adaptation to a study of the basic problems of infectious disease are dealt with in particular.

Only two main types of pathogenic reaction were encountered with monosporic wild-type lines of the pathogen, 'lesion' and 'fleck' [loc. cit.]. In lesion-fleck crosses pathogenicity to a given variety was usually conditioned by a single lesion-fleck

gene pair, which segregated alternately in the first and second nuclear divisions in the ascus. Each gene pair conditioned pathogenicity to a single group of apple varieties and to no other. So far six such gene pairs have been found, two having been shown separately to control pathogenicity to one apple variety, the fleck gene of each pair being epistatic to the lesion gene of the other.

The results of the above studies indicate that *V. inaequalis* comprises numerous biotypes with differential pathogenicity to various apple varieties and *Malus* species [ibid., 31, p. 387], their major origin in nature being by genetic combination.

The fungus has been cultured *in vitro* for 15 years without evidence of change in pathogenicity.

Klingbeil (G. C.) & Mitchell (A. E.). **Evaluation of concentrate spray coverage on large Apple trees by means of leaf prints.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 33, 4, pp. 302–309, 2 figs., 1951.

At the Graham Experiment Station, Michigan State College, tests were made of the spray deposits on Golden Delicious apple trees following two wettable sulphur and three ferbam sprays against apple scab (*Venturia inaequalis*) [*R.A.M.*, 32, p. 26] and also three insecticides at two and four times the conventional [unspecified] concentrations applied with a speed sprayer [ibid., 32, p. 27]. Commercial control of scab with slight fruit russeting was obtained. Spray coverage as shown by prints of the leaves, was uniform in all parts of the tree, but the build up of the spray deposit was greater on the leaves sprayed with the higher concentration. Less spray chemicals (three-fourths of that suggested normally) were used in the second cover spray and for the remainder of the season. The value of pruning to obtain good spray coverage is strongly emphasized.

Padfield (C. A. S.). **Materials suitable for use as grafting mastics.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 2, pp. 179–185, 7 figs., 1952.

Of the various materials tested for graft sealing on apple trees at the Fruit Research Station, Department of Scientific and Industrial Research, Auckland, New Zealand, bituminous compounds were most satisfactory.

Marsh (R. W.). **Field observations on the spread of Armillaria mellea in Apple orchards and in a Blackcurrant plantation.**—*Trans. Brit. mycol. Soc.*, 35, 3, pp. 201–207, 3 diags., 1952.

Preliminary recordings of *Armillaria mellea* infections in a Baldwin black currant plantation [cf. *R.A.M.*, 23, p. 112] at Long Ashton Research Station, Bristol, from 1932 to 1941 indicated that root contact was the main factor influencing the pattern of spread.

Observations from 1937 to 1951 in apple orchards [ibid., 30, p. 420] at Taunton and Glastonbury, Somerset, planted with standard trees differing greatly in age and variety, all on seedling stocks, were severely restricted by the inaccessibility of most of the roots. A tree could not be counted as infected until the mycelium had reached the trunk, and in some cases complete encirclement of the trunk did not occur until two to three years after infection was first noticed in one segment of the base. No relation between susceptibility and environment or variety was established. Very few trees under 15 years old were killed, but from 1940 to 1951 approximately half those over 30 years old died. In young trees the normal development of new roots may offset losses inflicted by *A. mellea*. Commerical plantings of dessert or cooking apples on vegetatively propagated semi-dwarfing stocks may suffer mortality within ten years. The losses caused by the fungus are of serious economic importance owing to the potential longevity of standard apple trees.

Poulos (P. L.) & Heuberger (J. W.). **Frog-eye leaf spot (black rot) control under epiphytotic conditions.**—*Plant Dis. Reptr*, 36, 11, pp. 410–411, 1952. [Multilithed.]

The results of preliminary experiments for the control of the leaf spot phase of apple black rot (*Physalospora obtusa*) [*R.A.M.*, 32, p. 260], conducted under epiphytotic conditions on the Starr variety at Bridgeville, Delaware, in 1952, indicate that parzate and dithane Z-78 both at 2 lb. per 100 gals. water, and thiolutin (120 p.p.m.) give satisfactory control. The average disease indexes (in a scale running from 0 to 10) were 2·1, 3·2, and 3·4, respectively, compared with 6·4 for the untreated.

Woodbridge (C. G.), Carney (A.), & McLarty (H. R.). **A boron deficiency in Pear growing in soil having an adequate boron content.**—*Sci. Agric.*, 32, 8, pp. 440–442, 2 pl., 1952.

A disorder of pear trees, similar to that caused by boron deficiency [*R.A.M.*, 30, p. 75], present in three orchards in the Trout Creek Point area, British Columbia, in early May, 1951, is briefly described. The boron content of shrivelled and healthy blossoms and leaves, and of affected and healthy trees was at a level usually associated with boron deficiency symptoms but soil analyses indicated a boron content adequate for tree development. A foliage spray of boric acid (1 lb. per 100 gals. water) speeded recovery and during the summer the foliage developed normally and twig growth was significant, but at the end of the growing season there was no difference between sprayed and unsprayed trees. The deficiency was attributed to interference with boron adsorption by a lowering of the soil moisture in the autumn and early spring by inadequate watering and the exceptionally dry April in 1951, when natural precipitation was only 0·24 in. compared with a 25-year average of 0·8 in.

Byrde (R. J. W.). **Experiments on the control of brown rot of Apples and Plums. II. Winter spraying trials.**—*J. hort. Sci.*, 27, 3, pp. 192–200, 1952.

Continuing his studies at Long Ashton Research Station, Bristol, on the control of brown rot of apples and plums caused by *Sclerotinia fructigena* and *S. laxa* [*R.A.M.*, 32, p. 85] the author found that in trials on detached, mummified plums infected with both fungi winter application of several eradicant fungicides (mainly organomercurials, arsenites, and substituted phenols and cresols) largely inhibited the production of sporing pustules, similar results being obtained with *S. fructigena* cankers on detached apple twigs. Many fungicides useful as protectants against infection by airborne spores displayed no eradicant effect on the mycelium in plant tissues.

Field applications of 0·2 or 0·3 per cent. phenyl mercury chloride in early March gave approximately 90 per cent. reduction in sporulation on overwintered, mummified Laxton's Superb apples and Giant Prune plums attached to the trees, but no significant reduction of infection resulted in the subsequent crops. Spore counts indicated that one mummified apple in early summer produces about 4,000,000 spores; the eradicant spray reduces this figure to approximately 400,000, but this suffices to infect a few developing, injured fruits. Each one so infected produces at least 10,000,000 spores, with the result that the infection potential of the newly rotted fruits rapidly reaches a point where it is greater than that of the overwintered mummies. The amount of fruit injury determines the subsequent rate of spread.

The difficulty of securing complete inhibition of sporulation by winter treatment lies in the fact that portions of mummified fruits may be so shielded that no spray can reach them. A feature of the winter spraying trials was the freedom of the trees from spray injury after dormant applications [cf. ibid., 31, p. 291]; only when treatment was delayed until bud burst did phytotoxicity result.

Further tests, aiming at greater inhibition of sporulation on a field scale with investigation of the effects of this on subsequent fruit infection, appear to be justified.

Taylor (H. S.). **Identification and control of bacterial spot of stone fruit.**—*N.Z. J. Agric.*, 84, 5, pp. 377–378, 4 figs., 1952.

Bacterial spot of plum (*Xanthomonas pruni*) [*R.A.M.*, 31, p. 21] has increased in severity and host range in New Zealand of recent years, but is rare on peach [ibid., 24, p. 375 and next abstract]. The disease has erroneously been termed bacterial canker. It is not transmitted by the common cicada (*Cicada* sp.) but the insects injure the bark, thus providing points of entry for the bacteria. Infection, which is rare on the foliage, causes black, depressed spots up to $\frac{1}{4}$ in. in diameter on the fruit. Bordeaux mixture sprays [cf. loc. cit.] applied at bud movement (5:4:50), petal fall ($\frac{1}{2}$:1:50), and three times more ($\frac{1}{2}$:1:50, $1\frac{1}{2}$:3:50, and $1\frac{1}{2}$:3:50) at three- to four-week intervals check effectively the spread of the disease and give good protection against fruit infection. English plum varieties are usually highly resistant.

Goldsworthy (M. C.) & Wilson (R. A.). **Terminal bud and shoot infections and the overwintering of Xanthomonas pruni in Peach trees.**—*Plant Dis. Reptr*, 36, 11, pp. 408–409, 1952. [Multilithed.]

Inoculation experiments in 1950 and 1951 at the Plant Industry Station, Beltsville, Maryland, showed that the peach bacterial spot organism (*Xanthomonas pruni*) [see preceding abstract] overwinters in terminal buds and shoots infected the previous autumn [*R.A.M.*, 20, p. 214; 29, p. 218]. The diseased condition, termed 'black tip', can be seen while the trees are still dormant in Atlantic seaboard orchards.

Hiratsuka (N.). **On the white rust of Peach.**—*J. Jap. Bot.*, 27, 8, pp. 229–238, 1952. [Japanese, with English summary.]

An account is given of the taxonomy and heteroecism of the peach white rust organism *Leucotelium* [*Puccinia*] *pruni-persicae*, which is widespread in Japan throughout central and south-western Honshu, Shikoku, and Kiushu [*R.A.M.*, 32, p. 198] and also occurs in China. Hori's description of the uredospore stage of this species is identical with the same stage of *Tranzschelia discolor* (p.p. *T.* [*Puccinia*] *pruni-spinosae* [loc. cit.]), but actually the uredospores of the former are quite different, being broadly ellipsoid or sub-globose, echinulate all over, and measuring 18 to 29 by 14 to 20 μ [ibid., 12, p. 248], while those of *P. pruni-spinosae* are oblong-clavate, oblong, or obovate, 25 to 42 by 14 to 23 μ, and nearly smooth at the apex where the epispore thickens to 5 to 9 μ.

Pupillo (M.). **Un metodo per il rapido rilevamento delle fruttificazioni di Coryneum beyerinckii sulle piante di Pesco.** [A method for the rapid detection of the fructifications of *Coryneum beijerinckii* on Peach plants.]—*Ric. sci.*, 22, 3, pp. 474–475, 1 fig., 1952.

The microscopic and cultural identification of *Coryneum beijerinckii* [*Clasterosporium carpophilum*], the agent of peach gummosis in Italy [*R.A.M.*, 26, p. 229 and above, p. 303], is stated to present exceptional difficulty. At the Institute of Plant Pathology, University of Bologna, the author has devised a rapid and simple method of detecting the fungus, consisting essentially in the repeated thorough rinsing in water of material from the branches or cortex, or of gum; the water is centrifuged and the residue examined under the microscope for conidia of *C. carpophilum*.

YARWOOD (C. E.) & HARVEY (H. T.). **Reduction of Cherry decay by washing.**—*Plant Dis. Reptr*, 36, 10, p. 389, 1952. [Multilithed.]

In trials carried out at the Department of Plant Pathology, University of California, Berkeley, to determine the effect of washing picked cherries on their keeping qualities, 55 per cent. of Lambert and 83 and 78 per cent., respectively, of two lots of Royal Ann were sound six or seven days after washing in tap water containing 0·1 per cent. triton B-1956, compared with 29, 19, 67 per cent., respectively, unwashed and 43 per cent. of Lambert washed in water only.

DUMAS (J.). **Une forme de dépérissement du Cerisier d'origine inconnue, observée dans la région lyonnaise.** [A type of Cherry tree withering of unknown origin observed in the vicinity of Lyons.]—*C.R. Acad. Agric. Fr.*, 39, 11, pp. 411–415, 1952.

Cherry trees at least six years old in the vicinity of Lyons, particularly white and red varieties, are affected by a type of degeneration generally characterized by scattered, pointed, grooved leaves, brightly streaked with autumnal colours. The trees wither and die towards midsummer. The new growth is stunted, annual shoots dwarfed or absent, the leaves sparse and, like the fruit, confined to the periphery of the tree. In severe cases when the disease develops slowly the extremities of one- or two-year-old branches wither or else the whole branch. The fruit is small and narrower at the distal end and generally of poor eating quality.

In August, 1951, all the affected trees in a plantation at Belleville-sur-Saône showed a renewal of vigour varying in degree but confined chiefly to an increase in the length and number of young branches. At the same time, however, two trees previously in good condition showed slight streaking and grooving.

As affected trees were not improved by the usual soil amendments the disorder may be due to some other deficiency or to a virus.

SKILES (R. L.) & KING (T. H.). **Strawberry stunt virus in Fragaria vesca.**—*Plant Dis. Reptr*, 36, 11, pp. 406–407, 1 fig., 1952. [Multilithed.]

Strawberry stunt virus [*R.A.M.*, 21, p. 30; 24, p. 423] was observed in 1951 on some Robinson strawberry plants in Minnesota. *Fragaria vesca* (East Malling clone) plants grafted to them developed symptoms distinct from those caused by the 1 and 2 viruses of Demaree and Marcus [ibid., 32, p. 262], the stunt virus causing no spotting and more severe dwarfing than virus 2.

CHAMBERLAIN (G. C.) & PUTMAN (W. L.). **Diseases and insect pests of the Raspberry in Canada.**—*Publ. Dep. Agric. Can.* 880, 32 pp., 25 figs., 1952. [Received April, 1953.]

Notes are given on the economic importance, symptoms, cause, and control of the principal diseases and disorders of raspberries in Canada, together with varietal reaction.

REID (R. D.). **Breeding Strawberries resistant to red core root rot.**—*Plant Dis. Reptr*, 36, 11, pp. 395–405, 8 graphs, 1952. [French summary. Multilithed.]

This is a general review of the work done since 1933 jointly by the Department of Agriculture for Scotland and the West of Scotland Agricultural College, Auchincruive, on the development of strawberry varieties combining resistance to red core (*Phytophthora fragariae*) [*R.A.M.*, 28, p. 528; 31, p. 70] and freedom from other diseases with acceptable fruiting characters. Little Scarlet, considered to be a form of *Fragaria virginiana*, may be useful as a source of resistance.

WALLACE (G. B.). **Wilt or Panama disease of Banana.**—*E. Afr. agric. J.*, 17, 4, pp. 166–175, 6 figs., 1 map, 1952.

Panama disease (*Fusarium oxysporum* f. [var.] *cubense*) [see above, p. 303 and next abstract] was detected in Tanganyika [C.M.I. map No. 31] in August, 1951, on the lower slopes of Kilimanjaro and in the plain below at elevations of 2,260 to 3,800 ft. There are no imports of bananas from outside East Africa, and the most plausible explanation of its introduction is that during troop movements in recent years between Mauritius and the new endemic area of Moshi, infected soil was introduced on the roots of plants. The present distribution and intensity of the disease indicate that it entered Tanganyika in 1950, or at least reached the banana groves in that year. According to the natives the disease did not become serious until after the April–May rains of 1951. The extent of the infected areas was at once investigated and a regular inspection in Moshi and its vicinity is being maintained.

In the control campaign that has been undertaken every effort has been made to secure the support of the native growers. The disease has been gazetted under the Plant Protection Ordinance, and any suspected case must be declared. When affected fields are replanted no varieties known to be susceptible are allowed. Fruits from affected fields must be consumed locally, and other parts of the plants must not be moved. Soil, including that on plants other than banana, must not be moved from affected fields, and precautions must be taken against its dissemination by any other means. Irrigation furrows should not pass through affected areas into clean land. Stocks of disinfectant are maintained in every affected area and diluted solution is kept ready for use by workers leaving affected fields. Contaminated banana material is destroyed as soon as possible by injection and spraying with hormone weed-killers; the total cost under local conditions (labour and materials) is only 26*s.* per acre, or about one-sixth of the cost of uprooting.

Of the banana diseases found in East Africa which might, in some cases, be confused with Panama disease, root rot (*Armillaria mellea*) [*R.A.M.*, 12, p. 552] is fairly common where banana groves occur on old forest or savannah land. *Marasmius semiustus* causes a root disease common in Uganda [ibid., 7, p. 703]; the leaves dry, brown areas spread inwards in the stem, and white mycelium is present in the stem and bulb. In the 'blackhead' group of diseases only *Thielaviopsis* [*Ceratostomella*] *paradoxa* [cf. ibid., 26, p. 456; C.M.I. map No. 142] has been found, and then only very rarely. Infested rhizomes bear dark, watersoaked areas spreading from the surface into the cortex. Sigatoka disease (*Cercospora musae*) [*Mycosphaerella musicola*: ibid., No. 7] is not common in Tanganyika; cigar-end rot (*Stachylidium* [*Verticillium*] *theobromae*) [ibid., No. 146] is usually of minor importance; anthracnose (*Gloeosporium musarum*) [*R.A.M.*, 29, p. 145] sometimes damages the fruit, especially in warm wet weather; and bacterial wilt (*Pseudomonas solanacearum*) [cf. ibid., 26, p. 457] has not been found on bananas in Tanganyika. The internal symptoms of the last differ from those of wilt: the vascular strands are yellow to dark brown, and cut surfaces exude dark, opaque bacterial slime.

ROY (R. S.) & SHARMA (C.). **Diseases and pests of Bananas and their control.**—*Indian J. Hort.*, 9, 4, pp. 39–52, 1 pl., 3 figs., 1952. [Received March, 1953.]

Brief notes are given on the incidence, symptoms, cause, and control of the principal stem, leaf, and fruit diseases of bananas in the Bihar region of India. The Kothia and Bagner varieties are resistant to Panama disease (*Fusarium oxysporum* [var.] *cubense*) [*R.A.M.*, 21, p. 440; 31, p. 131; 32, p. 200]. Pseudostem rot (*Gloeosporium* [*musarum*] and *Botryodiplodia* [*theobromae*: ibid., 13, p. 174]) attacks most of the table banana varieties in the Punjab and Bihar. Bunchy top virus, prevalent

in Bihar and other parts of India [ibid., 32, p. 211; C.M.I. map No. 19], does not attack Kothia, Muthia, Bagner, Batisia, or Anupan. Heart rot virus is spread by the same aphid (*Pentalonia nigronervosa*) as bunchy top [*R.A.M.*, 29, p. 469].

NIRVAN (R. S.). **'Bunchy top' of young Mango seedlings.**—*Sci. & Cult.*, 18, 7, pp. 335–336, 1 fig., 1953.

A mango disease of unknown origin, producing a 'bunchy top' effect [cf. *R.A.M.*, 29, p. 250], has been observed on young seedlings at the Government Gardens, Saharanpur, India, during the past three years. It usually appears during November and December, when nursery plants are four to five (sometimes only three) months old. The bunches of small thickened shoots, or occasionally several bunches, develop at the tip and lower down the main shoot in the leaf axils, the leaves being few and rudimentary. Most of the infected plants are eventually killed and those that survive do not give a good growth, thus causing serious losses in mango stocks; 0·7 per cent. of the 5,000 plants examined in the Government Garden Nursery showed infection in 1951 and it had increased to 1·3 per cent. by March, 1952.

NEMA (K. G.). **A fruit-rot of Carissa carandas Linn.**—*Sci. & Cult.*, 18, 7, p. 337, 1953.

At the Agricultural Research Institute, Nagpur, India, *Oospora citri-aurantii* [C.M.I. map No. 124] was isolated from a soft rot of karonda (*Carissa carandas*) fruits obtained from Nagpur market. Yellowish specks with a watersoaked, dark margin typical of the disease were produced on wounded ripe fruits and the fungus was reisolated in all cases. It was also pathogenic to wounded fruits of tomato, lime, sweet orange, grapefruit, and *Citrus reticulata*. *O. lactis-parasitica* from tomato failed to infect karonda or citrus.

NAITO (N.) & TANI (T.). **The influence of phytohormones on the conidial germination of Gloeosporium olivarum, causing the Olive anthracnose. The effect of 2,4-D on the mycelial growth of Gloeosporium olivarum.**—*Tech. Bull. Kagawaken agric. Coll.*, 2, pp. 27–30, 1950–1; 3, pp. 80–90, 1951–2. [Abs. in *Chem. Abstr.*, 47, 5, p. 2279, 1953.]

At the Kagawa Agricultural College, Japan, a 0·05 per cent. solution of either potassium 1-naphthalene acetate or 2,4-D [see next abstract] stimulated conidial germination of *Gloeosporium olivarum* [*R.A.M.*, 31, p. 500] and inhibited germ-tube development, 2,4-D exerting the more pronounced effect.

In further tests, the sodium salt of 2,4-D was added at six concentrations between 0·00005 and 0·32 per cent. to three kinds of culture media and the mycelial growth of the anthracnose fungus observed at 15° to 30° C. for three, five, and seven days. The higher concentrations caused a retardation and the lower ones an increase of growth. On a peptone agar medium the inhibitory action of 2,4-D was strongest with the addition of sucrose and glucose, intermediate with glycerol, weakest with ammonium tartrate, and absent without any additional source of carbon.

NAITO (N.) & TANI (T.). **The effect of 2,4-D in culture media on the mycelial growth, sporulation, and sclerotial formation of various pathogenic fungi. I. II.**—*Tech. Bull. Kagawaken agric. Coll.*, 3, pp. 119–125, 1951–2; 4, pp. 50–55, 1952–3. [Abs. in *Chem. Abstr.*, 47, 5, p. 2279, 1953.]

At the Kagawa Agricultural College, Japan, the mycelial growth of a number of fungi was inhibited by 2,4-D [see preceding abstract] at concentrations ranging from 0·08 to 0·32 per cent. The species were assigned to four groups on the basis of their degree of resistance to the phytohormone, namely, strong, represented by *Cephalothecium* [*Trichothecium*] *roseum*, *Corticium gramineum*, *Aspergillus niger*,

and *Ophiobolus miyabeanus*; less strong, *Schizophyllum commune* and *Gibberella saubinetii* [*G. zeae*]; rather weak, *Piricularia oryzae*, *Glomerella cingulata*, *Gloeosporium kaki* [*R.A.M.*, 26, p. 474], and *Pestalotia diospyri* [ibid., 15, p. 521]; and weak, *C. centrifugum* and *Sclerotinia sclerotiorum*. The species responding by increased mycelial growth to low concentrations of 2,4-D were *C. gramineum* (0·0005 to 0·02 per cent.), *O. miyabeanus* (0·00005 to 0·005 per cent.), and *C. centrifugum* (0·00005 per cent.). Sclerotial production in the last-named was not influenced by concentrations below 0·02 per cent., while in *S. sclerotiorum* it was increased to some extent at 0·005 to 0·02 per cent. Conidial formation of *G. olivarum* was retarded at all the concentrations tested.

In a further series of tests *Sclerotium hydrophilum* was placed in the strong group; *Macrosporium* [*Alternaria*] *porri* [ibid., 25, p. 581], *Hypochnus* [*C.*] *sasakii* [ibid., 32, p. 223], *Rhizoctonia tuliparum* [ibid., 20, p. 173], *S. oryzae-sativae* [*Leptosphaeria salvinii*: ibid., 26, p. 415], and *G. foliicolum* [ibid., 17, p. 26] in the less strong; *Glomerella cingulata* in the rather weak; and *Helminthosporium sigmoideum* [*L. salvinii*: ibid., 26, p. 415] and *Cortinellus shiitake* [*C. berkeleyanus*: ibid., 30, p. 97] in the weak. All concentrations from 0·00005 to 0·02 per cent. stimulated mycelial growth of *Corticium sasakii* but only the lowest increased that of *L. salvinii*. Weak doses suppressed and strong ones increased sclerotial formation in *C. sasakii* and *S. hydrophilum*.

Neuhaus (K.). **Methoden zur Bestimmung des Kupfergehaltes in Kupferkalkspritzbelägen auf Pflanzen.** [Methods for the determination of the copper content in copper-lime spray deposits on plants.]—*NachrBl. dtsch. PflSchDienst* (*Braunschw.*), *Stuttgart*, 4, 8, pp. 124–125, 1952.

Details are given of two procedures for the determination of the copper content of Bordeaux mixture spray deposits on plants. The ammonia method is applicable to large quantities of copper and the potassium ferrocyanide to small. Both involve the extraction of the copper in the deposit on small leaf sections by rinsing with sulphuric acid and treatment with the chemical, dissolved in water, to produce a coloured solution, which is compared colorimetrically with a solution of known copper content [c.f. *R.A.M.*, 31, p. 501].

Lockwood (J. L.), Leben (C.), & Keitt (G. W.). **A culture plate for agar diffusion assays.**—*Phytopathology*, 42, 8, p. 447, 1 fig., 1952.

A culture plate developed at the Department of Plant Pathology, University of Wisconsin, Madison, for the assay of fungicides, using *Glomerella cingulata* as the test organism [cf. *R.A.M.*, 30, p. 279], consists of a rimmed aluminium pan, 1 by 25 by 35 cm., with a piece of $\frac{1}{8}$ in. plate glass fitting closely in the bottom, and a cover made from a $\frac{1}{8}$ in. asbestos board. After autoclaving and cooling the assembled components, a small quantity of hot 4 per cent. agar is pipetted round the edges of the glass to seal it to the pan. When the seal has hardened 250 ml. seeded assay agar at 40° C. is added and left to solidify. The test substances, in paper disks or on seeds [ibid., 31, p. 601], are then applied. At the end of an incubation period of 24 to 40 hours the agar is loosened from the sides of the pan, the glass bearing the culture medium removed, and the inhibition zones are measured.

Townsend (G. R.). **Year-around field trials used in screening of fungicides.**—*Agric. Chemic.*, 7, 5, pp. 77, 79, 135, 2 figs., 1952.

The author describes the Florida Field Trials initiated in 1946 and located near Belle Glade for evaluating the performance of new fungicides [*R.A.M.*, 31, p. 542]. The advantages of the site are that disease incidence is usually more intense than in the north and two crops per season can be grown. Blight of potatoes and tomatoes

(*Phytophthora infestans*) [see next abstract], early blight of celery [*Cercospora apii*], cucurbit mildew [*Erysiphe cichoracearum*: ibid., 32, p. 169], and *Helminthosporium* blight of maize [*H. turcicum*] are used for testing fungicides on leaves, while those intended for seed or soil treatments are tested against a complex of soil-inhabiting fungi causing seed decay or damping-off in vegetables, cotton, and groundnuts. In December, 1951, when blight developed rapidly (100 per cent.) on untreated potato plots the percentage on plots sprayed seven times at weekly intervals until 11th December with 2 per cent. manzate [ibid., 32, p. 41] at 160 gals. per acre and 300 lb. per sq. in. was 26·2, and with dithane-zinc (2–1–100) at the same rate 27·5, compared with 65 per cent. for Bordeaux mixture (8–8–100); the corresponding yields were 320, 259, and 151 sacks (50 lb.) per acre. Ortho[cide] 406 and parzate also gave better results than Bordeaux.

Miller (P. R.). **Late blight appears. Cause and control of damping-off and root rot in conifer seedbeds.**—*Agric. Chemic.*, 7, 5, pp. 81, 83, 85, 137, 139, 1952.

By May, 1952, late blight of tomatoes (*Phytophthora infestans*) [*R.A.M.*, 31, pp. 226, 542; 32, p. 29, and preceding abstract] had been reported from the Vero Beach, Fort Pierce, Indiantown, West Palm Beach, Belle Glade, Homestead, and Bradenton areas of Florida. It occurred on potato [loc. cit.] in the Hastings area where most growers used a nabam-zinc sulphate spray. It was reported in Louisiana for the first time since the autumn of 1950, this being the earliest record of the disease on spring potatoes in the State.

Tobacco blue mould (*Peronospora tabacina*) occurred early in Georgia [ibid., 32, pp. 105, 119], later becoming widely scattered throughout the flue-cured area. Severe damage was averted by the use of 15 per cent. fermate dust at the rate of about 30 lb. per 100 sq. yd. The early appearance of the disease is attributed to the weather conditions which favoured primary infection and the rapid build-up and spread of secondary infection.

R. S. Cox states that in November, 1949, the conifer seed-beds in the State Forest Tree Nursery, Lincoln, Delaware, were seriously affected by a condition termed 'three-year root rot', as this is the common symptom on three-year-old white pine (*Pinus strobus*) seedlings, though Norway spruce (*Picea abies*) [*P. excelsa*] and Douglas fir (*Pseudotsuga taxifolia*) were also affected. On white pine the disease was characterized by severe needle browning and casting, occurring sometimes within two weeks of the primary browning of the tips in August. Seedlings of all three species were susceptible during all stages of growth up to three years old. The mortality rate was usually highest during the first year.

The isolates most consistently secured from diseased stems and roots closely resembled *Rhizoctonia* [*Corticium*] *solani* [ibid., 32, p. 111] and, except for Douglas fir, this form was more frequently obtained than other fungi from seedlings six months old or less, whereas on older seedlings *Fusarium* predominated. Other isolates were tentatively assigned to *Phoma*, *Botrytis*, and *Trichoderma* spp.

Pathogenicity experiments indicated that three *Rhizoctonia* isolates (only one of which fully resembled *C. solani*) caused pre-emergence damping-off of Norway spruce and white pine and post-emergence damping-off of these two and loblolly pine (*Pinus taeda*) and probably Douglas fir. They were the only isolates causing typical root rot symptoms. The pathogen was reisolated in many instances. An unidentified sterile form showed a slight degree of pathogenicity to Norway spruce and loblolly pine seedlings and was successfully reisolated from these species.

The preliminary results of field experiments initiated in April, 1950, to determine the efficiency of various soil fumigants were promising for chloropicrin and formaldehyde [ibid., 31, p. 297], the beneficial effect having lasted apparently throughout the first year. They suggest the value of proper soil treatment combined with

adequate precautions against injury from heat, cold, and drought as a preventive programme during the three years in the seed-bed.

JACKS (H.). **Health aspects of plant therapeutants.**—*N.Z.J. Agric.*, 85, 1, pp. 70, 71, 73, 75, 77–80, 9 figs., 1952.

Information is given on health hazards and toxic effects of various plant therapeutants [*R.A.M.*, 31, p. 428], including seed and soil disinfectants, soil and warehouse fumigants, fungicides, and insecticides, and a list of precautionary measures to be taken when using or applying them. Chemicals with poisonous action are listed in approximate order of toxicity and the toxic effects of some of the insecticides are summarized. Copper compounds, dithiocarbamates, zinc compounds, quinones, phthalimide, and glyoxalidine are relatively safe, but should not be used in large doses and should be stored carefully. Organo-mercury compounds and dinitro compounds are dangerous poisons, particularly the latter, and should be handled with great care. Necessary precautions against the disorders they can cause and treatments required are briefly described.

JACKS (H.). **Seed disinfection : V—A seed-dressing apparatus for the smaller seedsman.**—*N.Z.J. Sci. Tech.*, Sect. B, 34, 4, pp. 249–251, 1 fig., 1 diag., 1953.

In connexion with studies on seed disinfection [see below, p. 352] at the Plant Disease Division, Auckland, New Zealand, a small, electrically-powered seed-dressing machine, consisting of a frame, a motor, and a tilted mixing-drum, was designed to run at 38 r.p.m. for optimum coverage of seeds with protectant dusts. The capacity of the drum allows for treatment of 30 to 40 lb. of maize, French beans [*Phaseolus vulgaris*], peas, and wheat, and 18 to 25 lb. of oats.

PARKER-RHODES (A. F.). **The basidiomycetes of Skokholm Island IX. Response to meteorological conditions.**—*New Phytol.*, 52, 1, pp. 14–21, 1953.

A further study in this series [cf. *R.A.M.*, 31, p. 578] includes a statistical analysis of the interrelation between the fruiting of the basidiomycetes on Skokholm Island and the meteorological conditions prevailing during the preceding biological year. The method is applied to data concerning the abundance of 46 species in the island from 1947–51 and eleven meteorological factors. The most important factor influencing the fruiting of the grassland species in the current year was a cool, wet August and September. With species of other habitats the data were insufficient to provide results of independent significance. Humidity in September also affected the fruiting of grassland species significantly during the following year. It appears that the peculiarities of the Skokholm fungus flora are due primarily to those of the plant flora, and only indirectly to the climate of the island.

HAWKER (LILIAN E.). **The Lister memorial lecture. The physiology of Myxomycetes.**—*Trans. Brit. mycol. Soc.*, 35, 3, pp. 177–187, 1 pl., 1952.

The present knowledge of the physiology of the Myxomycetes is reviewed under the headings of factors influencing spore germination, nutrition and development of swarm cells and plasmodia, the effect of external conditions on the type of growth, and tactic movements of swarm cells and plasmodia in response to external stimuli.

CROCKER (W.) & BARTON (LELA V.). **Physiology of seeds. An introduction to the experimental study of seed and germination problems.**—xv [+3 unnumbered] +267 pp., 3 figs., 5 graphs, Waltham, Mass., The Chronica Botanica Co.; London, William Dawson & Sons, Ltd., 1953. $6.50.

This work, written from the point of view of the investigation of seed problems, outlines recent progress in seed technology and attempts to relate established

knowledge to unsolved problems. Sections of interest to the plant pathologist are included in chapter 2 on seed production (with the effects of disease thereon); in chapter 6 on respiration (the effects of fungi and bacteria thereon); in chapter 11 on storage and life span (including causes of deterioration); and the final chapter (17) on seed transmission of disease, which deals with the occurrence of seed-borne organisms, examples of these, the control of seed-borne diseases, treatment effects on seeds and germination, damping-off, factors affecting control of seed-borne diseases by disinfection, antibiotic organisms, effect of seed treatments on viability in storage, life-span of pathogens, and residual effects of seed disinfectants. Each chapter has a comprehensive list of references.

White (W. L.) & Darby (R. T.). **A refrigerator cabinet for fungal cultures.**—*Mycologia*, 44, 4, pp. 578–580, 2 figs., 1952.

A description and specification are given of a stainless steel cabinet for holding 21 trays of test tube slants of fungus cultures, made to fit an ordinary domestic refrigerator. Each tray holds 60 to 102 tubes lying horizontal and they have proved more satisfactory than wire baskets.

Scherr (G. H.). **A nephelometric technique for large cultures.**—*Mycologia*, 44, 4, pp. 575–577, 3 figs., 1952.

A unit devised to obviate the difficulties experienced in determining growth curves nephelometrically on larger cultures than can be contained by the cells of nephelometers [*R.A.M.*, 31, p. 544] is described. The cell is attached to a small side-arm affixed to an Erlenmeyer flask by rubber tubing. After addition of medium, autoclaving, inoculation, and incubation the flask is shaken and the cell filled by tilting. The cell is then inserted in the nephelometer and the reading taken against a standard. It is then reaffixed, emptied by tilting, and the culture returned to the incubator.

Licitis (Rasma). **Air-borne pollen and spores sampled at five New Zealand stations, 1951–52.**—*N.Z.J. Sci. Tech.*, Sect. B, 34, 4, pp. 289–316, 1 fig., 11 graphs, 1953.

During a survey in 1951–2 of air-borne pollen and spores at five stations in New Zealand [cf. *R.A.M.*, 32, p. 92] 10 to 12 [unspecified] species of fungi, of which those belonging to *Ustilago* [ibid., 31, p. 618], *Puccinia* [loc. cit.], and *Tilletia* [ibid., 31, p. 28] were most abundant, were recorded throughout the year on slides (coated with glycerin jelly and facing the wind). An increase in the number of fungal spores at the time when grass pollen was at a maximum was noticed at all stations, particularly at Christchurch, the counts being highest in November, December, and January.

Cercós (A. P.). **Substancia antibiótica volátil derivada de la fungocina.** [A volatile antibiotic substance derived from fungocin.]—*Cienc. e Invest.*, 8, 8, p. 376, 1952. [Received March, 1953. English summary.]

At the Phytotechnical Institute, Castelar, Argentina, fungocin [*R.A.M.*, 31, p. 395] yielded on dry distillation at more than 250° C. a volatile, yellowish, oily substance soluble in organic solvents and insoluble in water at pH 7. The growth of various organisms in Petri dishes, notably *Piricularia oryzae* and *Neurospora crassa*, was inhibited by affixing to the lids a piece of paper on which a small quantity of the substance in alcoholic solution had been dried. Similar results were obtained when the papers were fixed at the mouths of test-tubes containing streak cultures of the test organisms. The effect wore off rapidly as soon as the papers were removed.

Delmotte (P.) & Delmotte-Plaquee (J.). **A new antifungal substance of fungal origin.**—*Nature, Lond.*, 171, 4347, p. 344, 1953.

A new antibiotic substance was extracted from a culture filtrate of a mould (referred to *Monosporium*) by means of cold chloroform (5 per cent. by volume of the filtrate) at the Laboratory for Chemical Research, Ministry of the Colonies, Tervuren, Belgium. When the active substance was incorporated into Czapek agar it inhibited the growth of *Penicillium brevi-compactum*, *Aspergillus itaconitus*, and *Ascochyta pisi* at 25 p.p.m., *Botrytis cinerea* at 50 p.p.m., and *Alternaria solani* at 100 p.p.m. Spore germination of *P. cyclopium* and *P. stoloniferum* was inhibited completely at 5 p.p.m. There are indications that its molecular structure may be closely related to that proposed for mycophenolic acid [*R.A.M.*, 25, p. 175; 29, p. 524].

Bondartsev (A. S.). Шампиньон в роли разрушителя бетона и асфальта. [Fairy-ring mushroom as a destroyer of concrete and asphalt.]—Бот. Журн. [*J. Bot. U.S.S.R.* = *Bot. Zh. S.S.S.R.*], 37, 3, pp. 373–374, 1952.

In June, 1951, blisters appeared in an asphalt floor (3 cm. thick) of a factory in Leningrad. The floor had been laid out on concrete the previous year on the site of a concrete floor of long standing. The blisters cracked, gaps were formed, and by September they spread over an area of 80 to 90 sq. m. Finally fungus fruiting bodies identified as *Psalliota campestris* [*R.A.M.*, 15, p. 699] appeared. It is suggested that before relaying a floor any wood debris should be removed and the ground treated with 10 per cent. copperas or 5 per cent. copper sulphate.

Burnett (J. H.). **Oxygen consumption during sexual reproduction of some Mucoraceae.**—*New Phytol.*, 52, 1, pp. 58–64, 7 graphs, 1953.

A description is given of a manometric technique developed in the Department of Botany, Oxford University, for determining the oxygen consumption of sample disks of fungi growing in agar plate culture. There is evidence of an increase in oxygen consumption by heterothallic Mucoraceae in samples with young, actively growing hyphal tips from compatible mating-type cultures. The phenomenon is presumed to be due to the production of diffusible agents by these cultures initiating a modification of their metabolism. Although this hypothesis agrees with other observations on sexual reproduction in the Mucoraceae attempts to isolate the agents were unsuccessful.

Burnett (J. H.). **Oxygen consumption of mixtures of heterothallic and homothallic species in relation to 'imperfect hybridization' in the Mucoraceae.**—*New Phytol.*, 52, 1, pp. 86–88, 1953.

In the Department of Botany, Oxford University, small but significant increases in oxygen consumption, measured by the technique already described [see preceding abstract], were often observed in mixtures of species of the Mucoraceae that were reported to have shown 'imperfect hybridization' but never in those mixtures in which it did not occur. It is concluded that the initiation of sexual reproduction is brought about by diffusible agents similar to those believed to increase oxygen consumption in mixtures of compatible cultures of homo- and heterothallic Mucoraceae [loc. cit.].

Lu (S.). **A study of variation in black pigment production in Ustilago zeae (Beckm.) Unger.**—*Diss. Abstr.*, 12, 6, pp. 762–763, 1952. [Received April, 1953.]

Ustilago zeae [*U. maydis*] comprises an indefinite number of haploid biotypes which increase abundantly through hybridization and mutation and range in colour from white to anthracene purple with numerous intermediate hues. Only

1 per cent. of the isolates from Minnesota collections were black, but there were 20 per cent. from Ecuador, 32 per cent. from Guatemala, and 81 per cent. from Louisiana. These results confirm and amplify those obtained by Stakman *et al.* [*R.A.M.*, 23, p. 60] who found that chlamydospore collections from different localities may differ considerably in colour and pathogenicity. There is a certain amount of inbreeding in different localities accompanied by a tendency to the production of ecotypes. The black pigment appeared readily in colonies grown on potato dextrose agar but not on the synthetic medium tested. Colour production was found to depend on the occurrence of (*a*) phenolic compounds as chromogens or colour bases, (*b*) tyrosinase as the colour activator, and (*c*) the relative absence of ascorbic acid, a colour inhibitor. Pigmentation was intensified experimentally by adding certain phenolic compounds to the medium. The rate of mutation from black to white in three monosporidial black lines was about 0·1 per cent. The amount of variation and variability resulting from crossing black and white lines was so great that precise quantitative data on inheritance were unobtainable.

McClary (D. O.). **Factors affecting the morphology of Candida albicans.**—*Ann. Mo. bot. Gdn*, 39, 2, pp. 137–164, 3 pl., 1952.

At the Henry Shaw School of Botany, Washington University, a chemically defined, readily modified medium was employed to determine the factors affecting the morphology of the highly variable *Candida albicans* (A.T.C.C. 2091) [*R.A.M.*, 24, pp. 415, 416]. For filament production a readily assimilable but not so readily fermented carbohydrate, phosphorus, potassium, and biotin were required, an optimum temperature of 25° to 30° C., and a pH near 5. The yeast-like phase resulted from deficiency in any of the above nutrients, a high temperature (37° to 40°), especially on solid media, an unfavourable pH range, and the presence of toxic substances, and it also predominated in the declining phases of a culture. Chlamydospores were produced chiefly as the result of a too high or too low pH or phosphorus deficiency. The organism grew poorly, if at all, in an anaerobic jar on solid media. Growth on a sucrose medium was considerably better than that on readily fermented glucose and consisted of a greater proportion of filaments.

Moore (Helen) & Chupp (C.). **A physiological study of the Fusaria causing Tomato, Cabbage, and Muskmelon wilts.**—*Mycologia*, 44, 4, pp. 523–532, 1 fig., 1952.

A physiological study of *Fusarium oxysporum* f. *lycopersici* [*F. bulbigenum* var. *lycopersici*: *R.A.M.*, 32, p. 269] from tomato, f. *conglutinans* [*F. conglutinans*: ibid., 31, p. 362] from cabbage, and f. *niveum* [*F. b.* var. *niveum*: ibid., 31, p. 473] from melon made at Cornell University and Russell Sage College, New York, to determine differential reactions showed that all the isolates examined were able to utilize a number of carbon sources. All hydrolysed starch and used the ammonium ion, urea, peptone, proteose-peptone, and asparagine as nitrogen sources. None produced indole from tryptophane, or hydrogen sulphide from sulphur-containing proteins. Gelatin was liquefied by all isolates and pectate reduced; precipitation of casein and peptonization occurred in milk cultures. The addition of thiamin to a synthetic medium did not markedly affect growth rate.

The use of organic dyes as growth-inhibitors showed some promise as a means of diagnosing species. Broad groups may be separated by the use of crystal violet and malachite green in the culture medium, but positive identification of the organisms studied depends on further investigation into the range of growth with various concentrations of dye.

An extract from Valiant tomato plants inhibited growth of *F. conglutinans*, and the method of differentiating species by using plant extracts as inhibitory substances may, it is considered, be of value in diagnosis. Tomato plants wilted only slightly

in *F. conglutinans* filtrates but more markedly in those of the other two fungi. Bonny Best tomato plants in the *F. conglutinans* filtrate displayed no symptoms after 48 hours, though in 60 hours black, necrotic spots had appeared, starting at the leaf tips and edges and after one day spreading over the whole leaf. Leaf necrosis on Pan America tomato plants appeared within 48 hours in all the filtrates. Further work may possibly supply a basis for differentiating at least the cabbage strain from some other forms in the *elegans* group.

YARWOOD (C. E.). **Some water relations of Erysiphe polygoni conidia.**—*Mycologia*, 44, 4, pp. 506–522, 1 fig., 5 graphs, 1952.

Further studies on the xerophytism of *Erysiphe polygoni* [*R.A.M.*, 30, p. 384] at the University of California, Berkeley, showed that the conidia are characterized by their large size, fragility, large vacuoles, thin walls, and the active Brownian movement of particles in the protoplasm and vacuoles. The weight, volume, and surface area per spore were, respectively, 792×10^{-11} gm., 728×10^{-11} c.c., and 191×10^{-7} sq. cm. Conidial density averaged 1·094, as against 1·36 for uredospores of *Uromyces phaseoli* and 1·34 for conidia of *Peronospora destructor*. The moisture content was determined as 72 per cent. by the oven dry weight method and 53 to 74 per cent. by heat of solution in sulphuric acid. High water content might also be indicated by the low specific gravity and lack of shrinkage in a humid atmosphere.

In the laboratory, where a free water surface lost water at about 800 mg./hr./sq. dcm., the conidia lost water initially at about 0·64 mg., or about 0·08 per cent. of that from the water surface, indicating an efficient mechanism of water retention. Germination persisted after the mass of the spores had lost 72 per cent. of its moisture 20 hours after sowing in the bottom of an open Petri dish; water loss reached a maximum rate about eight hours after sowing and dropped to zero in about 72 hours. A 10,000 per cent. increase in the number of spores per unit area caused only a 32 per cent. decline in the rate of water loss per spore. Germinating spores lost 85 per cent. more weight in seven hours than did non-germinating spores and decreased in volume about three times as rapidly.

MORI (S.). **On the influence of hydrogen-ion concentration of culture media upon the antagonistic action of Streptomyces albus to plant disease fungi.**—*Ann. phytopath. Soc. Japan*, 15, 3–4, pp. 137–140, 1951. [Received March, 1953. Japanese, with English summary.]

The optimum pH for mycelial growth of *Ophiobolus miyabeanus* [*R.A.M.*, 29, p. 327] appeared to be 6·2 and for *Diaporthe* [*phaseolorum* var.] *batatatis* [ibid., 30, p. 503] 5·2 to 6·2, while *Streptomyces albus* [ibid., 31, pp. 270, 335] grew best on Czapek's agar at approximately pH 7·6. In mixed cultures on Czapek's agar *S. albus* inhibited the growth of *O. miyabeanus* between pH 3 and 8·6 and of *D.p.* var. *batatatis* between pH 4 and 8·6, the optimum pH for inhibition and activity of the antibiotic substance lying between 6·6 and 7·6.

GARRETT (S. D.). **Rhizomorph behaviour in Armillaria mellea (Vahl) Quél. I. Factors controlling rhizomorph initiation by A. mellea in pure culture.**—*Ann. Bot., Lond.*, N.S., 17, 65, pp. 63–79, 1 pl., 1953.

Studies were made at the Botany School, Cambridge, on the factors controlling rhizomorph initiation in a culture of *Armillaria mellea* [*R.A.M.*, 30, p. 307] isolated from *Daphne mezereum* at Cambridge in 1946. The isolate was unable to utilize nitrate nitrogen; ammonium tartrate was a suitable nitrogen source but inferior to peptone. Thiamin was essential for growth in a synthetic medium.

A 4 mm. inoculum disk taken from the margin of the colony and placed on a

fresh agar plate produced an outward growth of unorganized mycelium within 24 hours at 25° C. Rhizomorph initials appeared around the margin of the disk after seven days. As the carbohydrate concentration of the medium was increased the optimum concentration of nitrogen for rhizomorph initiation and growth increased also. On a medium of low nutrient status more rhizomorph initials were produced than were able to develop. This was attributed partly to a depletion of nutrients by the early growth of unorganized mycelium.

It is concluded that a certain threshold nutrient status of the substrate is essential for rhizomorph initiation. Once a rhizomorph has commenced growth on an agar plate the inception of independent initials in its neighbourhood is inhibited by the translocation into the rhizomorph of nutrients absorbed by the fringing mycelium, beyond which lies a zone of agar progressively depleted of nutrients as a result of diffusion.

DESAI (M. K.). **Relation of food to oospore production in Phytophthora.**—*Indian Phytopath.*, 3, 1, pp. 98–102, 1950. [Received March, 1953.]

This is an amplified account of investigations which have already been noticed from another source [*R.A.M.*, 29, p. 405].

WHEELER (H. E.). **The use of radiocarbon for tagging fungi.**—*Phytopathology*, 42, 8, pp. 431–435, 1 fig., 1 graph, 1952.

The pathogens used in experiments to determine the applicability of radiocarbon in the form of C_{14}-labelled sucrose for the purpose of imparting radio-activity or 'tagging' were *Glomerella cingulata*, *Botrytis cinerea*, *Helminthosporium victoriae*, *Colletotrichum falcatum* [*Physalospora tucumanensis*], and the sterile 'black patch' fungus [*R.A.M.*, 31, p. 286]. Their development was followed by autoradiography according to the methods of Fitzgerald *et al.* (*Science*, 114, pp. 494–498, 1951), using mostly Eastman Kodak No-Screen X-ray and Nuclear Track (NTB_2) emulsions.

Cultured on media with activities ranging from 2·5 to 30 microcuries per ml. for five to seven days, the growth characters of the species remained unchanged, except for a slight retardation of *G. cingulata* at activities exceeding 10 microcuries per ml. Cultures of the four sporulating species, however, developed lethal or mutagenic symptoms after longer periods (up to 60 days) on the active medium.

The 'tagged' spores were washed and transferred to ordinary media. Autoradiographs of the killed, dried cultures yielded no evidence of diffusion of C_{14} from the 'tagged' spores or germ-tubes into the surrounding medium before, during, or immediately after germination.

YAMAMOTO (W.). **The germination of spores of the sooty mould fungus, and the growth of their germ tubes, with special reference to the honeydews secreted by insects.**—*Ann. phytopath. Soc. Japan*, 16, 2, pp. 49–53, 1952. [Received March, 1953. Japanese, with English summary.]

The pycnidiospores of *Capnodium fuliginodes* germinated well in solutions of honeydew excreted by several species of aphids and scale insects and in some plant decoctions, but not in re-distilled water, glucose or sucrose solutions and only poorly in Richards's solution. The spores also germinated well in honeydew solutions treated with Japanese acid clay or siliceous earth but not in those treated with charcoal. Spore germination and germ-tube growth were better in solutions of honeydew from *Trichoregma bambusifoliae* after continuous boiling for 8 or 16 hours than in unheated solutions. Germination was also favoured on normal agar media containing sufficient biotin. It is concluded that the honeydew secreted by aphids and scale insects may contain biotin or an allied substance.

Sanford (G. B.). **Phloem necrosis of Potato tubers associated with infestation of vines by Paratrioza cockerelli Sulc.**—*Sci. Agric.*, 32, 8, pp. 433–439, 2 pl., 1952.

Experiments at the Dominion Laboratory of Plant Pathology, Edmonton, Alberta, showed that abnormal potato tuber phloem necrosis [cf. *R.A.M.*, 30, p. 118] and vine symptoms similar to those caused by virus may be associated with attacks by nymphs and adults of the psyllid *Paratrioza cockerelli* [ibid., 24, p. 70] on apparently healthy potato plants in the field during July and August. Evidence suggests that a toxic substance injected into the plant by the insect while feeding soon becomes systemic, but full recovery to normal health takes place in the progeny, indicating that the agent is not of virus origin. Tuber indexing tests showed that leaf roll virus [ibid., 31, p. 53] was absent. So far the toxin has not been transferred by grafting.

A genetic mutation in the local psyllid population is believed to have been responsible for the sudden appearance of phloem necrosis in Alberta in 1938.

Procter (C. H.). **Virus infection in certified seed Potatoes.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 2, pp. 192–194, 1952.

During a survey at the Department of Scientific and Industrial Research, Auckland, New Zealand, to determine the extent of masked virus infection in the 16 major potato varieties grown in New Zealand [*R.A.M.*, 20, p. 271], crops under certification in the Canterbury area were tested for potato viruses X and Y by inoculation to *Datura stramonium* and White Burley tobacco. Only Epicure and Jersey Bennes (International Kidney) were entirely free from both viruses. In some varieties the extent of virus infection varied considerably in different crops. Thus, while two crops of Arran Chief were virus-free, three others were infected. One crop of Majestic showed only 20 per cent. infection compared with 50 to 90 per cent. in four others. Similarly, all the samples from one Iron Duke crop carried infection as against 40 to 60 per cent. from four other crops. It is concluded that lines of some potato varieties comparatively free from virus X could be secured without any further selection. The presence of virus Y in a masked form in virtually all the samples of Aucklander Short Top and about 30 per cent. of Aucklander Tall Top indicated that they are a potential source of infection to adjacent crops of other varieties.

Wright (N. S.). **Studies on the witches'-broom virus disease of Potatoes in British Columbia.**—*Canad. J. Bot.*, 30, 6, pp. 735–742, 5 pl., 1952.

Studies on witches' broom virus of potatoes in British Columbia [*R.A.M.*, 31, p. 53] disclosed that symptom expression on the varieties White Rose and Netted Gem is delayed until the progeny of inoculated plants are grown. This may account for the spread of the disease in crops containing few, if any, visibly affected plants. Symptoms occurred on the leaves of the U.S.D.A. seedling 41956 within eight weeks of grafting. Two apparent strains of the virus from potato were distinguished on Bonny Best tomatoes and *Cyphomandra betacea* [loc. cit.], symptoms of one strain on tomato being similar to those already described [ibid., 8, p. 122] and of the other to those produced by tomato big bud virus [ibid., 31, p. 125; 32, p. 235]. Attempts at transmission by various insects and dodder (*Cuscuta campestris*) were unsuccessful. Symptom appearance on potato is preceded by an abrupt cessation of cambial activity and consequent under-development of secondary conducting tissue.

Slagg (C. M.). **Tuber symptoms of calico.**—*Amer. Potato J.*, 29, 5, pp. 123–124, 1 fig., 1952.

The author associates a complex of potato tuber symptoms, seen in the field in western Nebraska and Kansas and not previously known to him, with foliage showing

symptoms of calico virus, caused by *Marmor medicaginis* var. *solani* [a strain of lucerne mosaic virus: *R.A.M.*, 30, p. 283]. These include the reduction in size and flattening of the tubers, the amount of dwarfing increasing with the severity of the disease, gnarling or distortion, cracking, and corking of the bud end, and variegation in coloured tubers.

Allison (R. M.). **Effect of leaf roll virus infection on the soluble nitrogen composition of Potato tubers.**—*Nature, Lond.*, 171, 4352, p. 573, 1 fig., 1953.

In the Department of Scientific and Industrial Research, Christchurch, New Zealand, alcoholic extracts of healthy and leaf roll virus-affected tissue from tubers of seven potato varieties were applied to a one-dimensional paper chromatogram run in phenol: water at 75:25 w/v. Diseased tissue of Arran Banner, Arran Chief, Chippewa, and Dunbar Standard appeared to contain higher concentrations of glutamic acid, glutamine, and asparagine [cf. *R.A.M.*, 29, p. 528]. Two-dimensional chromatograms, run with *n*-butanol: acetic acid as the second solvent, showed that amino acids other than alanine, such as serine, accounted for the apparent differences in asparagine content.

Analyses of five other varieties by two-dimensional chromatography indicated that the differences in glutamic acid and glutamine are the most consistent; diseased tissue contained two to three times as much glutamine as healthy tissue. There were no consistent differences in the tyrosine and tryptophane content in the varieties tested [cf. loc. cit.]. The total amino-nitrogen in diseased tissue of Arran Pilot appeared to be reduced to approximately one-third of that present in healthy tissue. These results show promise of providing the basis for a simple and rapid diagnostic test for leaf roll virus in potato tubers.

Miyamoto (Y.) & Indo (H.). **Effect of high frequency radio waves upon Potato viruses.**—*Ann. phytopath. Soc. Japan*, 15, 3–4, pp. 127–130, 1951. [Received March, 1953. Japanese, with English summary.]

Leaf roll virus in May Queen potato tubers and crinkle mosaic [potato virus X+potato virus A] in Irish Cobbler were unaffected by irradiation with short or ultra-short radio waves [*R.A.M.*, 30, p. 633]. Potato virus Y in tobacco sap was unaffected by ultra-short waves (wavelengths 8·9 m., 36 cm., and 9 cm.) while the temperature of the sap remained below inactivation point.

Phillips (W. R.). **Potato storage.**—*Publ. Dep. Agric. Can.* 882, 21 pp., 8 figs., 1952.

This publication, to which N. M. Parks contributes an appendix, includes a brief section on potato storage disorders (pp. 17–18).

Edmundson (W. C.), Schaal (L. A.), & Landis (B. J.). **Potato growing in the western States.**—*Fmrs' Bull. U.S. Dep. Agric.* 2034, 58 pp., 34 figs., 1951. [Received March, 1953.]

This publication (replacing *Fmrs' Bull.* 1843) includes a long section (pp. 28–52) on potato diseases and their control in the western region of the United States [cf. *R.A.M.*, 27, p. 332; 29, p. 113].

Muncie (J. H.) & Hatfield (M. R.). **Field experiments on the control of Potato late blight.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 33, 4, pp. 332–336, 1951.

Spray and dust field trials for the evaluation of various fungicides against potato blight [*Phytophthora infestans*: *R.A.M.*, 32, p. 41 and above, p. 327] were carried out in 1950 at the Lake City Experiment Station and on potato farms in five counties in Michigan. Good control was obtained on the variety Chippewa with all the 12 fungicides tested at the Station. The sprays (nine applications) thiodow (a carbamate, at 2 qt.–1 lb. zinc), cop-o-zinc (4–100), and 1189 (a thiocyanate) and 1124

(two experimental compounds both at 4–100) gave the highest yields of 493·6, 454·9, 492·5, and 453·7 bush. per acre, respectively, followed by tribasic copper sulphate (4–100), crag 658 (2–100), and dithane D-14 (2 qt.–1 lb. zinc) with 450·1, 438, 406·5 bush. per acre, respectively, and 389·5 for the control. Bordeaux mixture gave only 388·4 bush. per acre at the Station, but in Kalcarka county it produced the highest yield, i.e., 261 bush. per acre, compared with 227 to 247 for crag, tribasic, and cop-o-zinc. In the field tests with seven of the fungicides the highest yields (bush. per acre) were: 508·2 for dithane D–14 and cop-o-zinc and 480·9 for crag 658 in Delta county; 347·1 for copper A plus zinc and 312·4 for dithane D-14 in Houghton county; 216·4 for the latter in Luce county, compared with 199·4 for cop-o-zinc and 180·9 for Bordeaux; and 520·7 for tribasic and 495·7 for cop-o-zinc in Menominee county.

In the dusting experiments (in Eaton County on Chippewa) crag 658 and cop-o-zinc gave higher total yields (562·4 and 600·4 bush. per acre) than [dithane] Z-78 and the experimental compound 1189 (532 and 447·2).

Payatsuik (V. V.). Внедрение ракоустойчивых сортов — залог успешной борьбы с Картофельным раком. [The introduction of wart-resistant varieties—a guarantee for the successful control of Potato wart.]—Сад и Огород [*Orchard & Garden*], *1951*, 12, pp. 54–57, 1951. [Received March, 1953.]

According to data obtained from the Potato and Vegetable Administration, Ministry of Agriculture, U.S.S.R., the cultivation of potato varieties resistant to wart disease [*Synchytrium endobioticum: R.A.M.*, 30, p. 428; 32, p. 208 and next abstract] resulted in a 25 to 30 per cent. yield increase in many parts of the Union. In recent years 15 new, resistant varieties have been developed, including Oktyabrenok, Imandra, Agronomichesky [Agronomical], Zazernuy, Zven' evoi, Trudovoi [Labour], Partisan, Kalev, Kungla, and Early Priekul'sky. Further work on these lines is in progress.

Sharikov (K. E.). Метод распознавания живых и мертвых зооспорангиев возбудителя Картофельного рака. [A method for detecting live and dead zoosporangia of Potato wart.]—Сад и Огород [*Orchard & Garden*], *1951*, 12, pp. 57–60, 1 fig., 1951. [Received March, 1953.]

In studies on potato wart disease [*Synchytrium endobioticum*: see preceding abstract] at the Minsk Scientific Research Station, U.S.S.R., plasmolysis was found to be one of the most promising methods for distinguishing between live and dead zoosporangia. Of all the mineral salts tested, only five or six appeared to be good plasmolyzers, sodium chloride (36 gm. per 100 ml. water), sodium nitrate (51), ammonium chloride (32), and ammonium nitrate (48) particularly being recommended for general use. They can be applied either singly or as a mixture consisting of 17 gm. sodium nitrate, 10 gm. ammonium chloride, and 16 gm. ammonium nitrate per 100 ml. water. In several experiments live zoosporangia were repeatedly 100 per cent. plasmolyzed, while the dead ones (killed by formalin or continuous boiling) were not plasmolyzed at all. Boiled ones were not infective. In infected potatoes kept for five years under dry air conditions, 90 per cent. of the zoosporangia were still reckoned as viable as indicated by plasmolysis, and susceptible potatoes planted in pots of soil containing this material became infected even at a small spore dose.

To obtain infected material from the soil, it is sieved, shaken with carbon tetrachloride, and centrifuged for a minute or two. The liquid is then placed on a watch glass to evaporate (15–20 minutes) and the residue soaked in water for 24 hours at least. Shrinking of the protoplasm sometimes occurs even in the dead cells. Deplasmolysis is, therefore, recommended to facilitate the distinction between real plasmolysis and posthumous phenomena resembling it.

Massey (P. H.), Thompson (H. C.), & Smith (Ora). **Varietal susceptibility of Potatoes to internal black spot.**—*Amer. Potato J.*, 29, 6, pp. 127–135, 3 graphs, 1952.

Investigations were carried out at the Department of Vegetable Crops, Cornell University, New York, on the relationship between susceptibility to internal black spot (or bruise or blue disease) of potato [*R.A.M.*, 31, p. 31] and high tuber quality (or high specific gravity) [ibid., 30, p. 429] and on the susceptibility of some new and standard varieties when grown in different parts of New York. In the specific gravity test the potatoes were separated into nine specific gravity ranges of 0·005 unit each, using calibrated salt solutions. The samples were then placed at 40° F. Later the tubers were removed from storage for mechanical bruising and immediately returned. Two days later they were peeled and the blackening index of each lot was determined. Ratings were made by Scudder's system ('Black spot of Potatoes': Thesis, Cornell University, 1951) on a 0 to 9 (severe blackening) scale. The blackening index $\left(\frac{\text{per cent. black} \times \text{rating}}{10}\right)$ was considered to give the best estimate of blackening.

In 1949–50, variety trial material of six varieties from a uniform 'seed' source was planted in five counties. Tuber samples (50 lb. each) were taken in October and treated as above, the first samples being rated in January and others in March. In 1950–51 nine varieties were grown in six counties.

The results in 1949 gave a highly significant positive correlation (0·933) between internal black spot index and specific gravity in Katahdin potatoes grown on Long Island. Though other factors influence blackening there is an association between the specific gravity of the tuber and the index. Internal black spot is no longer confined to Long Island but is becoming increasingly prevalent throughout New York State. In the 1950–51 trials the positive correlation between specific gravity and internal black spot index was 0·468. Several varieties reacted differently in different counties. Ontario, however, blackened consistently more than the other varieties almost everywhere, while Ashworth, Pontiac, and Kennebec were the least sensitive. The most practical means of control are careful handling to avoid bruising, especially after very long storage, and the use of less susceptible varieties.

Suzuki (N.) & Uritani (I.). **On some constituents showing positive reaction by Ehrlich's aldehyde reagent in brown-rotted tissues of Sweet Potato.**—*Ann. phytopath. Soc. Japan*, 16, 2, pp. 54–56, 1952. [Received March, 1953. Japanese, with English summary.]

Sections of sweet potato tissue rotted by *Helicobasidium mompa* [*R.A.M.*, 30, p. 337], *Ceratostomella* [*Ceratocystis*] *fimbriata* [ibid., 31, p. 294], and *Thielavia basicola* developed a red colour when mounted in Ehrlich's aldehyde reagent. Affected tissue yielded an oily substance giving a similar colour reaction and consisting of a mixture of ipomoeamaron (described by Hiura in 1943 as a sesquiterpene) with a terpene having a lower boiling point. Both reacted positively with the reagent. The oily substance may aid the host in resisting invasion by the above pathogens.

Stump poisoning and root disease.—*Circ. Rubb. Res. Inst. Malaya* 36, 3 pp., 1952.

This paper on the control of root disease (*Fomes lignosus*, *F. noxius*, and *Ganoderma pseudoferreum*) in *Hevea* rubber replantings in Malaya summarizes briefly information already noticed from other sources [*R.A.M.*, 30, pp. 387, 540; cf. 32, p. 276].

JOHN (K. P.). **A hitherto undescribed leaf disease of Hevea Rubber caused by a species of Colletotrichum.**—*J. Rubb. Res. Inst. Malaya*, 14, *Commun.* 278, pp. 11–19, 3 pl., 3 figs., 1952.

A species of *Colletotrichum* frequently occurs on mature leaves of young *Hevea* rubber in Malaya [*R.A.M.*, 30, p. 541] and occasionally causes leaf spotting on mature trees. The almost circular lesions, up to 5 mm. in diameter, with reddish-brown lower and ash-brown upper surfaces are scattered all over the leaf. They may be associated with spots caused by *Helminthosporium heveae* [loc. cit.]. The setae have two to five septa and measure 84 to 170 (average 133) by 4 to 5 μ. The conidia measure 13 to 20 by 4·5 to 8 (average of 20, 16·1 by 6·6) μ. The spores germinate after about one hour in distilled water.

The fungus grows rapidly on potato dextrose agar, forming a luxuriant, woolly, dark grey aerial growth. The hyaline spores, pinkish in the mass, measure 10 to 22 by 4 to 5 (average of 20, 15·9 by 4·7) μ.

When a green apple was inoculated and kept in a moist chamber, in ten days a surface rot covered an area 1·5 in. in diameter. The spores borne on setae measured 19 to 24 by 4 to 6 (average of 25, 20·9 by 5·3) μ and those produced in acervuli 16 to 24 by 4·2 to 8 (average of 30, 19·6 by 5·8) μ. After 22 days the whole apple was discoloured. Inoculation experiments showed that the fungus is able to cause severe infection of young rubber seedlings, which under certain conditions results in leaf fall.

The fungus resembles *C.* [*Glomerella*] *gossypii* [ibid., 16, p. 410] and *C. derridis* [ibid., 29, p. 476] in bearing spores on setae and in its spore measurements, but is distinct from *C. ficus*. Inoculations of *Hevea* rubber with an isolate of *C. derridis* from *Derris elliptica* failed to produce leaf spots, though the isolate produced fairly large lesions on *D. elliptica*; inoculations with the *Hevea* fungus produced small lesions on derris. A leaf-spotting *Colletotrichum* similar in all respects to that on rubber and pathologically indistinguishable from it was found on *Manihot glaziovii*, and the two organisms are considered to be identical. The *Hevea* pathogen is provisionally regarded as a strain of *C. derridis*.

BUCHWALD (N. F.). **Fysiogene sygdomme hos landbrugsplanterne. II. Speciel del mangelsygdomme.** [Physiogenic diseases of agricultural plants. II. Special part, deficiency diseases.]—*K. VetHøjsk.* [*Kbh.*], 40 pp., 1952. [Mimeographed.]

The information originally presented in the section of part II of 'Physiogenic plant diseases', by C. Ferdinandsen and the author, dealing with the principal mineral deficiencies of agricultural plants [*R.A.M.*, 16, p. 626], is recapitulated with the necessary additions to bring it up to date.

EASTWOOD (D. JEAN). **The fungus flora of composts.**—*Trans. Brit. mycol. Soc.*, 35, 3, pp. 215–220, 1952.

At the Macaulay Institute for Soil Research, Aberdeen, quantitative determinations of fungi (by the dilution plate method) in composts of fresh lawn mowings and barley straw demonstrated that these organisms are destroyed in the middle of both composts by the high temperature which develops (up to 65° C.). After this phase greater fungus development follows in the straw compost, but in grass composts, which tend to become more compact and more alkaline, adverse physical and chemical conditions may be limiting.

Some of the fungi survive initially at the margins of the compost and persist during the composting period. In straw composts the cellulose decomposers become particularly active. The most frequent fungi isolated from the straw compost were *Chaetomium globosum* and *Monotospora* sp.

Newhall (A. G.) & Schroeder (W. T.). **New flash-flame soil pasteurizer.**—*Bull. Cornell agric. Exp. Sta.* 875, 19 pp., 9 figs., 1951. [Received 1952.]

In this expanded account of the flash type soil pasteurizer previously described [*R.A.M.*, 30, p. 245] evidence is adduced showing that treatment with the apparatus successfully controlled pre- and post-emergence damping-off of stock [*Matthiola* sp.], tomato, and eggplant in soils from five different localities in western New York, one sample being suspected of harbouring *Phytophthora parasitica*, another *Verticillium albo-atrum*, and a third several root-rotting organisms, such as *Rhizoctonia*, *Ascochyta*, *Fusarium*, and *Alternaria*. The data obtained also indicated that flame-pasteurized soil can be cooled and safely planted immediately after treatment. It would, however, probably be desirable to store pasteurized soil while still hot, as some soils may harbour infected roots, stems, or sclerotia which might not be completely sterilized in the short exposure period.

Soil known to be infested with *P. parasitica* was heated to 170° F., some being cooled immediately and some stored for one, two, and five hours before cooling. Healthy tomato seedlings were pricked into it. No plant grown in any of the treated soil developed any symptom of infection, though many in the untreated soil from the same lot were attacked and died. In a further test two batches of similarly infested soil were heated to 180° and 220°, respectively. Foot rot developed freely in tomato seedlings in unheated soil, and in two out of six pots with soil heated to 180°, but none in that heated to 220°.

Tomato plants grown in soil heated to 170° and stored one, two, or five hours before cooling developed no infection by *V. albo-atrum* and the fungus could not be recovered from them, but it was present in plants grown in similar unheated soil and they developed typical symptoms of infection.

Eggplants grown in soil infested with *V. albo-atrum* previously heated to 180° or to 220° developed no symptoms of disease, whereas those in unheated soil were visibly affected.

Abbott (E. V.) & Martin (J. P.). **The Sugarcane disease situation in Peru.**—*Plant Dis. Reptr*, 36, 10, pp. 387–388, 1952. [Multilithed.]

During a survey in July, 1952, of sugar-cane diseases in Peru a species of *Sclerospora* [cf. *R.A.M.*, 32, p. 278], first recorded in 1950, was again observed. It caused under 1 per cent. infection in plantations of P.O.J. 2878, H. 32–8560, H. 37–1933, and the local variety, Azul de Casa Grande. The disease is characterized by severe stunting and excessive tillering; the leaves are thickened, erect, and mottled, with wavy margins, and little or no millable cane is produced. Stem galls at or near ground-level, developing sometimes into adventitious buds which result in shoot proliferation, appear to be associated with infection. Recommended control measures include roguing and destroying the diseased plants, selection of healthy planting material, optimum drainage conditions, and planting resistant varieties such as P.O.J. 2878.

Among the other diseases observed were mottled stripe (*Xanthomonas rubrisubalbicans*) [ibid., 11, p. 473], eye spot (*Helminthosporium sacchari*) [ibid., 31, p. 515], sheath rot (*Cytospora sacchari*) [C.M.I. map No. 256], and a leaf spot resembling brown stripe (*Cochliobolus stenospilus*) [*R.A.M.*, 28, p. 142].

Dale (W. T.). **A review of the position with regard to Sugar-Cane leaf scald in British Guiana.**—*Trop. Agriculture, Trin.*, 29, 1–3, pp. 9–11, 1 col. pl., 1952.

This paper gives a résumé of the information on sugar-cane leaf scald (*Xanthomonas albilineans*) previously noticed from another source [*R.A.M.*, 31, p. 144].

Cooke (W. B.) & Shaw (C. G.). **The Suksdorf fungus collections.**—*Res. Stud. St. Coll. Wash.*, 20, 4, pp. 135–145, 1952; 21, 1, pp. 3–56, 1953.

This list of type collections of fungi is based on specimens in the Suksdorf collection of fungi at the State College of Washington and in other herbaria. The fungi are listed alphabetically according to the binomials originally assigned to them, and complete lists of synonyms are not presented. If, however, the binomial originally assigned is no longer in current usage, the synonym employed in the body of the paper is given.

Greene (H. C.). **Notes on Wisconsin parasitic fungi. XV.**—*Amer. Midl. Nat.*, 48, 1, pp. 37–54, 1952. [Received April, 1953.]

Included in this further critically annotated report on Wisconsin parasitic fungi [cf. *R.A.M.*, 32, p. 279] and additional hosts, besides four other new species and two new combinations, is *Ascochyta cypripedii* n.sp., which produces narrow, brownish lesions with a dark brown border on leaves of *Cypripedium candidum* and has pycnidia measuring about 100 to 150 μ in diameter and conidia 6 to 8 by 3 to 3·5 μ. *Ramularia anagallidis* is recorded on *Veronica 'spicata'* (cult.) and *Alternaria radicina* [*Stemphylium radicinum*: ibid., 2, p. 5; 31, p. 224] on carrot.

Cooke (W. B.) & Shaw (C. G.). **Cercosporella in Washington.**—*Lloydia*, 15, 2, pp. 125–128, 1952.

Descriptions are given of six species (one new) of *Cercosporella* causing leaf spotting in the State of Washington on hosts other than Gramineae. The type material of *C. columbrina* on *Erigeron peregrinus* is shown to be *Entyloma compositarum* [*R.A.M.*, 27, p. 100], chlamydospores of which were abundant in every lesion from which mounts were made. Assuming that the dividing line between *Ramularia* and *Cercosporella* is the presence in the latter of acicular or scolecosporous spores whose length to breadth ratio is 10 : 1 or more, all the material of *C. nivosa* on *Pentstemon* spp. examined was referable to *Ramularia* [cf. ibid., 8, p. 260], to which it is transferred as *R. nivosa* (syn. *R. pentstemonis*).

Payak (M. M.). **Some new records of fungi from the Bombay State.**—*Sci. & Cult.*, 18, 7, pp. 342–343, 1953.

Among the additional new records of fungi for the State of Bombay [*R.A.M.*, 32, p. 38] collected from 1950 to 1952 are *Dasturella grewiae* on *Grewia asiatica* and *Scopella gentilis* on *Mimusops hexandra* [ibid., 29, p. 480].

Chona (B. L.) & Munjal (R. L.). **Notes on miscellaneous Indian fungi. I.**—*Indian Phytopath.*, 3, 1, pp. 105–116, 8 figs., 1950. [Received March, 1953.]

The first paper in this series devoted to new species, new host records, or new records for India comprises descriptions of 18 species, including *Myriangium duriaei* [*R.A.M.*, 26, p. 335] on a scale insect on white mulberry (*Morus alba*) at Darjeeling; *Puccinia cynodontis* [ibid., 31, p. 476] on leaves and leaf sheaths of *Cynodon plectostachyum*, *Spegazzinia ornata* [cf. ibid., 7, p. 475] on dead leaves of *C. dactylon*, *Darluca genistalis* [cf. ibid., 19, p. 730] on uredia of *P. cynodontis* on *C. plectostachyum*, *Pleosphaeropsis dalbergiae* on *Dolichos lablab*, and *P. thevetiae* n.sp. on *Thevetia nerifolia*, all at New Delhi; *Endothiella robiniae* n.sp. and *Diplodia profusa* on *Robinia pseudoacacia* and *Septoria geranii* on leaves of *Fragaria indica*, all at Simla; *P. anonae* n.sp. on *Annona squamosa* at Kumaon; *P. cryptostegiae* n.sp. on *Cryptostegia grandiflora* at Lahore; and *P. psidii* n.sp. on guava at Poona.

Thirumalachar (M. J.) & Mundkur (B. B.). **Genera of rusts III.**—*Indian Phytopath.*, 3, 1, pp. 4–42, 23 figs., 1950. [Received March, 1953.]

A further contribution to this series [cf. *R.A.M.*, 30, p. 248; 31, p. 402] comprises an annotated list of 30 genera of the Uredinales together with notes on four fossil rust genera and six doubtful or excluded species.

Ramakrishnan (T. S.). **Some interesting rusts of South India.**—*Indian Phytopath.*, 3, 1, pp. 43–50, 7 figs., 1950. [Received March, 1953.]

Notes are given on nine rusts collected recently in South India, including five new species, new records for India, and new host records. *Aecidium pulneyensis* Ramakrishnan & Srinivasan n.sp., common on *Canarium commune* in the vicinity of Kodaikanal, causes witches' brooms on the branches and hypertrophied spots on the leaflets. The black, amphigenous, subcuticular pycnia measure up to 100 by 60 μ, the aecidia 0·5 to 0·8 mm. wide and up to 2 mm. long, and the verrucose or reticulate peridial cells 41 to 50 by 17 to 27 μ. The reddish-brown aecidiospores measure 23 by 46 by 17 to 23 (average 33 by 20) μ with a wall up to 5 μ thick. The uredosori are hypophyllous with peripheral incurved paraphyses, and the pedicellate, obovate or elliptical uredospores measure 23 to 35 by 15 to 23 (average 29 by 21) μ.

Venkatarayan (S. V.). **Notes on some species of Corticium and Pellicularia.**—*Indian Phytopath.*, 3, 1, pp. 81–86, 1950. [Received March, 1953.]

The author makes further changes from *Pellicularia* to *Botryobasidium* [*R.A.M.*, 28, p. 32; 30, p. 248] giving the following new combinations: *B. album* (*P. alba* Dastur [ibid., 26, p. 13]), *B.* (*Corticium*) *salmonicolor* [loc. cit.], and *B.* (*Pellicularia*, *Corticium*, and *Sclerotium*) *rolfsii* [ibid., 26, p. 20; 32, p. 206]. The identity of *P. filamentosa* [*C. solani*] causing banded leaf blight of arrowroot (*Maranta arundinacea*) [ibid., 29, p. 194] is doubted, and a comparison is drawn between this fungus and *B. rolfsii*.

Bakshi (B. K.). **Oedocephalum lineatum is a conidial stage of Fomes annosus.**—*Trans. Brit. mycol. Soc.*, 35, 3, p. 195, 1 pl., 1952.

The recently described *Oedocephalum lineatum* [*R.A.M.*, 29, p. 509] is now considered to be the conidial state of *Fomes annosus* [ibid., 30, p. 295]. A fruiting body very similar to the sporophore of that fungus was produced in a malt agar culture of *O. lineatum*, which also caused 11·8 per cent. loss in dry weight of blocks of Scots pine sapwood after four months, indicating that it is a wood-destroyer.

Yamamoto (M.). **Miscellaneous notes on fungi collected in Oze District.**—*Ann. phytopath. Soc. Japan*, 16, 2, pp. 69–71, 1952. [Received March, 1953. Japanese, with English summary.]

Notes are given on 17 fungi collected in the Nikko National Park, Oze, Japan, in July, 1948. The asci and ascospores of a *Leptosphaeria* sp. parasitic on *Rhododendron metternichii* var. *degronianum* were considerably smaller than those described for *L. rhododendri*. *Allium iatissimum* is a new host for *Alternaria allii* [*R.A.M.*, 10, p. 777; cf. 25, p. 581].

Katsuki (S.). **Materials for a Cercospora-flora of the Kanto District.** (1).—*Ann. phytopath. Soc. Japan*, 15, 3–4, pp. 143–145, 1 fig., 1951. [Received March, 1953.]

Notes are given on sixteen species of *Cercospora* occurring in the Kanto district of Japan including one new to science. The carrot pathogen hitherto referred to in

Japan as *C. apii* var. *carotae* [*R.A.M.*, 31, p. 362] is now identified as *C. carotae* by the characteristics of the conidia and conidiophores [cf. ibid., 8, p. 630].

Wei (C. T.). **Notes on Corynespora.**—*Mycol. Pap., Commonw. mycol. Inst.*, 34, 10 pp., 25 figs., 1950.

The author proposes the name *Corynespora cassiicola* n.comb. [*R.A.M.*, 31, p. 479] for the fungus causing leaf spot of cowpea, soy-bean, melon, cucumber, papaw, *Hevea* rubber, and other hosts, synonyms being *Helminthosporium cassiicola*, *Cercospora* (≡ *Corynespora*) *melonis* [loc. cit. and ibid., 29, pp. 222, 346], *Cercospora vignicola* [ibid., 28, p. 559], *H. vignae* [loc. cit.], and *H. papayae* [ibid., 18, p. 505]. In generic characters *Corynespora melonis* and the cowpea fungus agreed in all features except that in the former it was impossible to see the conidia remaining in chains. However, according to Güssow this is a transitional character. The conidiophore at any one time bears only a single conidium or chain of conidia at the apex and elongates by proliferating through the terminal conidial scar. In a typical *Cercospora* (*C. apii*) new conidiophore growth occurs beside the tip, pushing the previous spore aside, while in *Helminthosporium* (*H. velutinum*) the conidia form verticils. An amended description is given of *Corynespora* which is probably most closely related to *Helminthosporium*, both having similar conidial structure. Sixteen collections of *H. cassiicola* in Herb. I.M.I. occurring on 11 different hosts from the tropics and from type material were examined and identified as belonging to *Corynespora*. The measurements of the conidia and conidiophores agreed closely with *C. melonis*. The epithet *cassiicola* was given in 1869 and antedates all others.

Damon (S. C.). **Type studies in Dictyosporium, Spiera, and Cattanea.**—*Lloydia*, 15, 2, pp. 110–124, 2 figs., 1952.

After establishing the limits of the genus *Dictyosporium* [cf. *R.A.M.*, 18, p. 295], and relegating *Speira* and *Cattanea* to synonymy, the author gives detailed notes, with a key, on four valid species (one new) and three new combinations. In notes on 'species inquirendae et excludendae' it is pointed out that the conidia of *D. yerbae* are morphologically identical with those of *Sporodesmium moriforme* [cf. ibid., 4, p. 61], *S.* (*Coniosporium*) *paradoxum* [ibid., 30, p. 547], and *S. nitens*, the slight differences in size being considered insufficient to maintain the species as separate. *S. nitens* antedates *S. paradoxum* but the final disposition of these names must await clarification of *Coniosporium*.

Cooke (W. B.). **Nomenclatural notes on the Erysiphaceae.**—*Mycologia*, 44, 4, pp. 570–574, 1952.

A list is given of the corrected forms of the names applicable to species of Erysiphaceae [*R.A.M.*, 32, p. 215] known before 1832, the first name listed in each case being in conformity with the recently revised rules of nomenclature [ibid., 32, p. 101], and the second the name used by Salmon and other workers following him, if incorrect, with citations of any other names necessary to elucidate synonymy.

New names include *Podosphaera clandestina* var. *tridactyla* n.comb. (syn. *P. oxyacanthae* var. *tridactyla*), *Sphaerotheca macularis* n.comb. (syn. *S. humuli*), *S. m.* var. *fuliginea* n.comb., *Microsphaera penicillata* (syn. *M. alni*), and *M. p.* var. *vaccinii* n.comb. (syn. *M. alni* var. *vaccinii*). *Erysiphe cichoracearum* is given as a synonym of *E. communis*.

Bisby (G. R.). **The name Oidium.**—*Trans. Brit. mycol. Soc.*, 35, 3, pp. 236–237, 1952.

Reasons are given for recommending the adoption of *Oidium* Sacc. for the conidial states of the Erysiphaceae [see preceding abstract] and the rejection of *Oidium*

Link ex Fr. [*R.A.M.*, 22, p. 178], with a consideration of the claims of *Acladium* and *Acrosporium*.

Wehmeyer (L. E.). **Studies in the genus Pleospora. II.**—*Lloydia*, 15, 2, pp. 65–109, 61 figs., 1952.

In this contribution to the present series [cf. *R.A.M.*, 29, p. 123, and next abstracts] the author discusses a large number of *Pleospora* collections [ibid., 32, p. 102] representing the 5- to 7-septate spore group which shows the origin of the *vulgaris* and *herbarum* series, only those collections with smooth or slightly tomentose perithecia being considered. Intermediate types will always be found, but it has been found convenient to set arbitrary limitations to the groups under discussion. *P. vulgaris* has 5-septate spores with no vertical septa in the end cells, which are usually longer than the central cells. The spores are slightly curved, with blunt ends. *P. herbarum* is set apart from both *P. media* (10 per cent. or more of the spores have vertical walls in the end cells, and they are 28 μ long or less) and *P. armeriae* (7-septate spores over 40 μ) largely on spore-size and includes those collections with some spores over 28 μ but all under 40 μ in length. Round each of these species are grouped other species and varieties, many of them new, differing in other features. *P. herbarum* has variable perithecia 100 to 500 μ in diameter, strongly stromatic and with a wall 20 to 80 μ thick; the asci are stout and clavate (75) 90 to 150 (200) by 18 to 32 μ, thick-walled, particularly at the apex; and the biseriate spores 20 to 40 by 8 to 14 (16) μ, fusoid-ellipsoid to oblong-ellipsoid, yellow-brown, dark yellow-brown, or red-brown, somewhat constricted at the central septum and often at the secondary septa, usually straight, sometimes inequilateral, larger spores commonly asymmetrical with the upper portion broader, shorter, and rounded (sometimes taper pointed) and the lower narrower, longer, and more tapered, with the ends mostly broadly rounded but sometimes bluntly tapered. A long synonymy is given.

Wehmeyer (L. E.). **Studies in the genus Pleospora. IV.**—*Mycologia*, 43, 5, pp. 570–589, 20 figs., 1951.

The present contribution to the author's studies on *Pleospora* [see preceding and next abstracts] deals with members of the *P. herbarum* series with glabrous or tomentose perithecia and in which the spores have developed beyond the 7-septate condition by the insertion of additional transverse septa. Annotated descriptions are given of 12 species, of which three are new.

Wehmeyer (L. E.). **Studies in the genus Pleospora. VI.**—*Amer. J. Bot.*, 39, 3, pp. 237–243, 13 figs., 1952.

In this final contribution to the present series [see preceding abstracts] the author terminates his discussion of the genus *Pleospora* with a review of the relationships of 11 species (one new one) and one variety (new), all of which possess spores with more than five transverse septa and a symmetrical, *vulgaris* type of septation.

Huysmans (C. P.). **Bestrijding van blisterblight (Exobasidium vexans) in Thee op Sumatra.** [Control of blister blight (*Exobasidium vexans*) of Tea in Sumatra.]—*Bergcultures*, 21, 21, pp. 419–425, 427–429, 431–433, 435–437, 439–441, 443–445, 447–449, 451, 453, 455, 457, 459–461, 463, 16 figs., 3 graphs, 1 map, 1952. [English and Indonesian summaries.]

This is a useful summary of the available information on the life-history and relation to environmental conditions of blister blight of tea (*Exobasidium vexans*) and its control in Sumatra [*R.A.M.*, 30, p. 82] by chemical and cultural methods [ibid., 32, p. 151].

Copper-containing fungicides have been found superior to all others tested during the two-year period of investigation. They should be applied at intervals of four to five days for absolute control, though in practice an eight-day round is generally adequate. Of the spraying equipment tested, a pressure-retaining knapsack has given the best results, using 500 gm. 50 per cent. copper oxychloride in 150 to 200 l. water per ha. Dusting may be carried out at 15 kg. fungicide per ha. with hand or motor appliances, the former requiring a concentration of 2 per cent. and the latter 4 to 6.

There is hardly any difference in the retention of sprayed and dusted copper oxychloride. After four days nearly all the copper has disappeared. The initial copper dust covering of wet leaves is heavier than that of dry ones. Motor dusters throw up a dense cloud which drifts rapidly over and through the crop, and they are able to cover 20 to 50 ha. daily at a low labour cost. Favourable conditions for this treatment, which is particularly suitable for steep hillsides, include a heavily overcast sky and strong winds.

Predictions as to crop losses from blister blight are unreliable, so that only approximate estimates of the profitability of chemical treatments can be formed. The treatment for two to three months of all pruned bushes at elevations above 1,500 ft. is generally reported to pay, and the same applies to those at upwards of 2,700 ft. when growing in unfavourable places or severely weakened.

A correlation between blister blight and atmospheric humidity constitutes the best basis for forecasting outbreaks of the disease. Thus, when the five-day value of the mean humidity between 6 a.m. and 6 p.m. exceeds 83 per cent. for 12 days, an attack of moderate severity occurs, while a 20-day period at the same moisture-level results in heavy infection.

Resistance to *E. vexans* has not yet been observed in Sumatran tea bushes.

Stover (R. H.) & Koch (L. W.). **Methyl bromide as a soil fumigant for controlling diseases and weeds in Tobacco seedbeds.**—*Sci. Agric.*, 32, 8, pp. 411–420, 3 pl., 1952.

This is an amplified account of information already noticed from another source [*R.A.M.*, 31, p. 248].

Roberts (D. A.). **Independent translocation of sap-transmissible viruses.**—*Phytopathology*, 42, 7, pp. 381–387, 2 figs., 1952.

Experiments were carried out at the Department of Plant Pathology, Cornell University, Ithaca, New York, to test the hypothesis that the movement of sap-transmissible viruses is not necessarily associated with translocation of food materials. Preliminary experiments, in which part of the stem or petiole was scalded to arrest translocation, indicated that the phloem was chiefly concerned in the movement of the viruses of tobacco mosaic, tobacco ring spot, cucumber mosaic, and potato X in tobacco and Scotia bean (*Phaseolus vulgaris*) plants. Starch accumulated along the midribs and veins of previously starch-free, inoculated leaves above scalded stems or petioles when the leaves were kept dark while the rest of the plant was subjected to continuous illumination. The darkening of inoculated leaves did not reduce the velocity of virus translocation, but by decreasing the rate of multiplication in such leaves it indirectly influenced the development of systemic symptoms which appeared in all parts above the scalded sections [cf. *R.A.M.*, 12, p. 119; 19, p. 619, *et passim*]. It is thus presumed that sugars moved into the inoculated leaf against the flow of virus out into the plant [ibid., 13, p. 660]. When an upper and a lower starch-free leaf on tobacco or *Nicotiana glutinosa* were inoculated, each with a different virus, both viruses became systemic and could be recovered from each inoculated leaf, whether the plant was darkened or not.

These results are considered to support the theory of independent translocation of sap-transmissible viruses, which is most plausibly explained by the assumption that the translocation mechanism normally operating in plants provides for the bidirectional flow of materials in the phloem.

Virus X inoculum from Turkish tobacco half leaves kept in darkness before and after inoculation invariably caused fewer local lesions on *Gomphrena globosa* than inoculum from corresponding half leaves continuously illuminated after inoculation. The conclusion that virus multiplication is affected by this treatment was confirmed by the virus titre.

Steere (R. L.) & Williams (R. C.). **Identification of crystalline inclusion bodies extracted intact from plant cells infected with Tobacco mosaic virus.**—*Amer. J. Bot.*, 40, 2, pp. 81–84, 2 figs., 1953.

A method of removing intact the crystalline inclusion bodies from hair cells of tobacco plants infected with tobacco mosaic virus [*R.A.M.*, 31, p. 212; 32, p. 218] by freeze-drying the hairs and dissecting out the crystals was evolved at the Virus Laboratory, University of California, Berkeley. It was demonstrated by electron microscopy that the crystals consist solely of tobacco mosaic virus particles, many of them infective, and a volatile solvent, the total dry volume of the particles accounting for approximately one-third of the crystal volume.

Schneider (I. R.). **Solution of Tobacco mosaic virus in the aqueous phase of a chloroform-water emulsion and application of this phenomenon in virus assay.**—*Science*, 117, 3028, pp. 30–31, 1 graph, 1953.

Experiments at the Plant Pathology Division, University of California, Berkeley, showed that when homogenized plant tissue is shaken in a chloroform-water emulsion the bulk of the plant constituents accumulate at the interface between the two liquids; chlorophyll and some other constituents dissolve in the chloroform, but tobacco mosaic virus remains dispersed in the aqueous phase. As this dispersion provides a means of separating the virus from host proteins it has been used as the basis of a method for virus assay [which is fully described]. The optical density (ultraviolet absorption at 260mμ) of the assay fraction minus the optical density of a comparable healthy preparation is directly proportional to the concentration of tobacco mosaic virus present. Experimental results showed that the technique provides a rapid and relatively accurate assay method for the virus [cf. *R.A.M.*, 31, p. 149].

Ruizhkov (V. L.). Влияние аминокислот и близких к ним соединений на репродукцию вируса Табачной мозаики. [Effect of amino acids and related substances on the production of Tobacco mosaic virus.]—Докл. Акад. Наук СССР [*C.R. Acad. Sci. U.R.S.S.*], N.S., 80, 4, pp. 677–680, 1951. [Received March, 1953.]

Experiments were carried out at the Ivanovsky Institute of Virology, U.S.S.R. Academy of Sciences, to determine the effect of amino acids and related substances on the development of tobacco mosaic virus [*R.A.M.*, 29, p. 58; 32, pp. 144, 152].

Nicotiana glutinosa leaves were inoculated with tobacco mosaic virus and half was partially dipped in the solution under experiment, while the control halves were dipped in water. Necrotic reaction was observed three to four days later. Norleucine (0·1 per cent.) and taurine (0·1 per cent.), neither of which is present in tobacco mosaic virus, were the strongest inhibitors, giving inhibition indexes of 89 and 94 per cent., respectively (measured by the relation between the number of necrotic lesions on the part of the leaf above the solution and on that dipped in it) as against 18 per cent. for the control. These two substances also gave the lowest virus titre as expressed by the number of necrotic lesions on 20 half leaves of

N. glutinosa in an experiment to determine their effect on accumulation of the virus in tobacco leaves, the numbers obtained after seven to ten days being 51 and 15, respectively, as against 200 and 64, respectively, for the controls. In this experiment inoculated tobacco leaves were halved longitudinally, one-half being placed in the solution (changed daily) and half in water.

The results indicate that the multiplication of tobacco mosaic virus depends largely on the amino acid composition of the medium. Glutamic acid, theonine, lysine, and cysteine are particularly powerful inhibitors of both the necrotic reaction and the multiplication of the virus in tobacco leaves.

Takahashi (W. N.) & Ishii (M.). **A macromolecular protein associated with Tobacco mosaic virus infection : its isolation and properties.**—*Amer. J. Bot.*, 40, 2, pp. 85–90, 8 figs., 1 diag., 2 graphs, 1953.

Details are given of the X protein detected by electrophoresis in extracts of tobacco, tomato, and *Phlox drummondii* plants infected with tobacco mosaic virus at the Department of Plant Pathology, University of California, Berkeley [cf. *R.A.M.*, 31, p. 302]. Its ultraviolet absorption maximum was at 280m μ, and the electrophoretic mobility 4×10^{-5} cm./sec./v./sec. in 0·1 ionic strength cacodylate buffer of pH 7. The isoelectric point was approximately pH 3·9. In 0·1 M acetate buffer at pH 7 electron micrographs revealed the protein particles to be about 15m μ in diameter and more or less spherical; after dialysis they were even smaller [cf. ibid., 32, p. 218]. When mixed with rabbit antiserum prepared against purified tobacco mosaic virus from tobacco the protein from both tobacco and *Phlox* gave positive precipitin reactions. The purified protein was polymerized into rod-shaped particles resembling those of tobacco mosaic virus and of the same diameter (15 μ).

Istituto Scientifico Sperimentale per i Tabacchi. Relazione tecnica anno 1951. [Scientific Experimental Institute for Tobaccos. Technical Report, year 1951.] —*Tabacco*, 56, 634, pp. 131–141, 1952.

In the section of this report dealing with phytopathology (pp. 136–138) it is stated that in preliminary experiments 0·1 per cent. solplant wettable sulphur gave control of tobacco powdery mildew [*Erysiphe cichoracearum*: cf. *R.A.M.*, 28, p. 36; 29, pp. 267, 386]. At Verona seven hybrids were resistant to mosaic [virus: cf. ibid., 29, p. 585; 30, p. 83]; two are being crossed with the chief varieties grown in Italy.

Strong (M. C.). **Preliminary tests of fungicide combinations in Tomato sprays and dusts.**—*Quart. Bull. Mich. agric. Exp. Sta.*, 33, 4, pp. 320–325, 6 figs., 1951.

The results of a single season's tests (1950) with various combinations of fungicides (five applications) for the control of tomato blight [*Phytophthora infestans*: *R.A.M.*, 32, pp. 41, 89 and next abstract] and anthracnose [*Colletotrichum phomoides*: ibid., 31, p. 521; 32, p. 41] on Improved Garden State in cold frames at Blissfield, Michigan, indicate that sprays were more effective against blight than the corresponding dusts. Defoliation percentage, reduced by all the treatments and particularly by 4–2–100 tribasic copper plus zerlate spray mix (32 per cent.) and cop-o-zinc plus zerlate spray mix (39 per cent.) at the same strength, ranged from 32 to 40 per cent. for sprays and 60 to 72 for dusts as against 95 for untreated. The combinations of fungicides used in these experiments are as yet not recommended to growers, though the results are promising, as they need to be confirmed by further experiments.

Wager (V. A.). **Late blight in Tomatoes.**—*Fmg in S. Afr.*, 27, 315, pp. 333–334, 336, 6 figs., 1 diag., 1952.

In May, 1951, tomato fruits at Port Shepstone, South Africa, were extensively

damaged by blight (*Phytophthora infestans*) [*R.A.M.*, 31, p. 537]; within a few weeks it had spread to numerous localities in Natal and during the following months caused heavy losses in the eastern Transvaal. In Durban the disease persisted until the end of November and caused fruit losses in spite of the hot weather and absence of leaf infection. It appeared again in epidemic form at the beginning of March, 1952. Hitherto it has been of rare occurrence in the Union. Fruit infection is easily confused with that of brown rot caused by *P. parasitica* [ibid., 15, p. 265] which occurs in hot weather, often following a severe rainstorm. Directions for control [see preceding abstract] in the seed-bed and field by spraying and dusting are given.

Ciccarone (A.) & Carilli (A.). **Prove di lotta contro Alternaria porri (Ell.) Saw. f. sp. solani (E. et M. pro sp.) Neerg. in agro di Scafati (Salerno).** [Experiments on the control of *Alternaria porri* (Ell.) Saw. f. sp. *solani* (E. et M. pro sp.) Neerg. in the field at Scafati (Salerno).]—*Ann. Sper. agr.*, N.S., 6, 4, pp. 1077–1092, 3 figs., 4 graphs, 1952. [English summary.]

In a field spraying test carried out at Scafati, Italy, in 1951 for the control of natural infection by *Alternaria solani* [*R.A.M.*, 32, p. 41] on San Marzano tomatoes five applications starting on 5th July of 1·5 per cent. Bordeaux mixture, 1 per cent. shirlan A.G. [ibid., 31, p. 521], and 0·35 per cent. thiram (tulisan) gave average numbers of spots per leaflet of 0·99, 1·64, and 7·17 respectively. Infection on the stems and shoots was very abundant, inducing death of the organs above, and none of the treatments is considered to have given satisfactory control under the experimental conditions.

In a varietal resistance test Southland [ibid., 30, p. 635] had significantly less spotting (0·92 to 1·17 per cent.) than the other varieties and it also displayed some resistance to *Fusarium* [*bulbigenum* var. *lycopersici*: ibid., 32, p. 154] and *Verticillium* [*albo-atrum*: ibid., 32, p. 106] but its resistance was not sufficient to warrant its issue to farmers.

Dimond (A. E.) & Waggoner (P. E.). **The biological activity of mixtures of lycomarasmin and glutamic acid, glutamine, glutathione, or cysteine.**—*Science*, 117, 3028, pp. 42–43, 1953.

In an investigation at the Connecticut Agricultural Station, New Haven, of the ability of glutamic acid, glutamine, glutathione, and cysteine to reduce the toxicity to tomato cuttings of lycomarasmin [*R.A.M.*, 32, pp. 221, 269] in the presence of iron, which activates the toxicity of this substance, the concentration of each component of the mixture was 0·001 *M*, and a small tomato cutting was placed in each mixture, the toxic effect being observed after 18 hours. The results showed that the toxicity of the ferro- or ferri-lycomarasmin complex was not reduced by any of the test substances and therefore they would be ineffective as antidotes.

Brown (J. M. B.). **Studies on British Beechwoods.**—*Bull. For. Comm. Lond.* 20, iv+100 pp., 28 pl., 4 graphs, 1 map, 1 diag., 1953. 12*s.* 6*d.*

In the section of this publication dealing with fungi associated with beech in Great Britain (p. 57) [cf. *R.A.M.*, 32, p. 222] it is stated that in very damp seasons the seedlings are sometimes killed in large numbers by *Phytophthora* '*omnivora*' [cf. ibid., 7, p. 290]. The chief fungal enemy of young beechwoods is probably *Nectria ditissima* [cf. ibid., 15, p. 694]; cankers of the *Nectria* type [ibid., 32, p. 108] have been recorded in beech plantations in various parts of the country, most frequently in the southern part of the Cotswold Hills. Canker development is usually preceded by bark injury; for example, two badly affected 15- to 20-year-old stands in the Stroud district, Gloucestershire, had recently been extensively pruned.

Beech is relatively resistant to *Armillaria mellea* [cf. ibid., 19, p. 195] and *Fomes annosus* [ibid., 6, p. 763; 10, p. 355; and above, p. 341], but the latter has recently been

found on young beeches associated with severely affected pines [loc. cit.] in Thetford Chase, Norfolk. There is evidence (unpublished notes by R. Bourne) that *Polyporus adustus* [cf. ibid., 26, p. 36; 31, p. 91] is an important contributor to the failure of beeches on dry chalk escarpments and ravines.

The condition referred to as 'black heart' affects the heartwood at various vertical levels and, while it does not reduce the strength of the timber, renders it unsuitable for certain special purposes. It is usually confined to somewhat overmature stands and appears to be specially associated with shallow, calcareous soils.

Liese (J.). **Pflanzenphysiologische Betrachtungen zum Ulmensterben.** [Plant physiological observations on the dying-off of Elms.]—*Arch. Forstw.*, 1, 1–2, pp. 59–70, 10 figs., 1 graph, 1952.

The prevalence of Dutch elm disease (*Ceratostomella ulmi*) in the Oder and Elbe valleys, Germany [cf. *R.A.M.*, 22, p. 53], is attributed in the first place to the absence during the last 20 winters of the flooding which normally accompanied melting snow in earlier decades, with a consequent fall in the underground water table. The shallow roots of older trees are exposed to the air and the vessels become prematurely occluded by tyloses, so that they can no longer conduct or store water. Trees weakened in this way are highly susceptible to attacks by elm bark beetles, *C. ulmi*, and other secondary pathogens. Suckers arising from the shallow roots are also very susceptible, but plants raised from seed, which strike deeper to begin with, should be more resistant, and hence there is no reason to regard the elm as doomed in this region.

Müller-Kögler (E.), Sy (M.), & Thielicke (W.). **Über Versuche zur Bekämpfung des Eichenmehltaus.** [On experiments on the control of Oak mildew.]—*Forst u. Holz*, 7, 12, pp. 159–162, 1952.

The following recommendations for the control of oak mildew (*Microsphaera quercina*) [*M. alphitoides*] in Germany [*R.A.M.*, 11, p. 682] are based on experiments carried out in 1951 in a State forest in Hanover following a virulent outbreak of the disease in 1950. Two applications (12th July and 22nd August) of liquid or wettable cosan resulted in a definite improvement in the condition of the young plants as compared with the untreated, but four treatments, at monthly intervals from mid-June to mid-September, are probably advisable. For mild cases a concentration of 0·2 per cent. is apparently adequate, but for more severe attacks it should be raised to 0·4 per cent. Pincer ('Zange') nozzles proved superior to the ordinary type, especially with the lower dosage of cosan. No conclusion can be reached as to the profitability of this method of control on the basis of one year's experiments. The cost of one application (inclusive of labour) is estimated at DM. 50·7 per ha.

Guyton (T. L.). **An unusual occurrence of Oak wilt in Pennsylvania.**—*Plant Dis. Reptr*, 36, 10, p. 1386, 1952. [Multilithed.]

Oak wilt (*Chalara quercina*) [*Endoconidiophora fagacearum*: *R.A.M.*, 32, p. 285] was observed in the autumn of 1952 on a half-mile line of dead oak trees, mostly red oak [*Quercus* spp.], near Manns Choice, Bedford County, Pennsylvania. The trees had been blazed during the preceding April and more than three-quarters of them became infected. The nearest disease outbreaks in 1950 or 1951 are believed to have been about a quarter-of-a-mile away.

Riley (C. G.). **Studies in forest pathology IX. Fomes igniarius decay of Poplar.**—*Canad. J. Bot.*, 30, 6, pp. 710–734, 3 pl., 8 graphs, 1952.

In a further contribution to this series [cf. *R.A.M.*, 31, p. 215] decay caused by *Fomes igniarius* (var. *populinus*) was studied at the Petawawa Forest Experiment

Station, Ontario, in stands of *Populus tremuloides* and *P. grandidentata* [ibid., 28, p. 439; 30, p. 396] up to 70 years old. In eight $\frac{1}{10}$-acre sample plots, representing stands 60 to 70 years old, 28·6 to 69·2 per cent. of the trees were infected, the percentage of decay in the gross merchantable volume being 3·2 to 14·3 in the decayed trees and 0·9 to 8·1 in decayed and sound taken together. Equally wide ranges were obtained in younger age groups. The net periodic increment continued to increase in the 60- to 70-year age group on favourable sites.

Artificial inoculations in both sapwood and heartwood of living trees resulted in the development of typical decay from which the pathogen was reisolated. Observations from 4th May, 1940, to 30th June, 1941, on 5 to 18 sporophores confirmed that *F. igniarius* sporulates continuously from early spring to late autumn. Periods of inactivity during which new tube layers are formed [ibid., 21, p. 314] do not necessarily occur, although periods without sporulation varying from one to several days are common. Sporulation is favoured by high relative humidity and high temperature; the lowest temperature at which it was observed was 40° F. *Polyporus dryophilus* var. *vulpinus* was responsible for the decay of many trees on one of the plots (44 years old) and of a few trees in another.

McKeen (Constance G.). **Studies of Canadian Thelephoraceae IX. A cultural and taxonomic study of three species of Peniophora.**—*Canad. J. Bot.*, 30, 6, pp. 764–787, 2 pl., 2 figs., 6 diags., 1952.

Further studies in this series [cf. *R.A.M.*, 31, p. 524] demonstrated the need for the specific separation of *Peniophora heterocystidia* [ibid., 28, p. 441], *P. mutata* [ibid., 30, p. 18], and *P. populnea* on the basis of differences in the colour and thickness of the fruit bodies, the shape and relative numbers of cystidia and gloeocystidia, host range, cultural characters, and interfertility tests. *P. populnea* is restricted to poplar and *P. heterocystidia* to other broad-leaved trees. In interfertility tests, isolates of *P. mutata* from poplar were completely interfertile as were those from other hosts, but pairings between these two groups exhibited various degrees of incompatibility. Conidia were produced abundantly in cultures of all the species but were found in nature only in two collections of *P. heterocystidia*.

Potter (G. F.), & Crane (H. L.). **Tung production.**—*Fmrs' Bull. U.S. Dep. Agric.* 2031, 41 pp., 19 figs., 1 map, 1951. [Received March, 1953.]

This publication includes a brief section (pp. 34–35) on diseases of tung (*Aleurites fordii*) in the United States [cf. *R.A.M.*, 28, p. 365].

Larsen (C. S.). **Studies of diseases in clones of forest trees.**—*Hereditas, Lund*, 39, 1–2, pp. 179–200, 5 figs., 1 graph, 1952.

A specimen of *Pseudotsuga taxifolia* f. *glauca* planted in the Forest Botanical Garden, Charlottenburg, in 1889 differs from others of its kind in Denmark in its prolific growth without a trace of *Rhabdocline pseudotsugae* [C.M.I. map No. 52; *R.A.M.*, 32, p. 157], which has been present in the Garden for the last 15 to 20 years. Only about 50 m. away is a 28-year-old blue-grey tree from the Yellowstone National Park, Wyoming, which has been constantly and severely attacked by the pathogen ever since its introduction. In 1943 a few scions from the healthy *glauca* tree were grafted on a five-year-old one of the green [*viridis*] type. After a few years of satisfactory healthy growth they suddenly became heavily infected by *R. pseudotsugae*, which since then has recurred every year in the same way. Towards the end of the summer the scions, except for the current year's shoot, are virtually defoliated. The *glauca* Douglas firs now appear as the diseased upper portions of typical green specimens, the latter being infested by *Chermes* [*Adelges*] *cooleyi* but not by *R. pseudotsugae*, whereas the diseased *glauca* tops are entirely free from *Adelges*.

Unlike *R. pseudotsugae*, which is restricted to the blue [*glauca*] and grey [*caesia*] forms of *P. taxifolia* [cf. ibid., 31, p. 41], *Phaeocryptopus gaeumanni* is a menace to the green one, at any rate in Denmark [C.M.I. map No. 42].

A clone of *Thuja plicata* resistant to *Didymascella thujina* [ibid., No. 149] has been obtained from an exceptionally hardy tree in a Jutland forest.

Reichert (I.) & Chorin (Matilda). **A rust disease of Aleppo Pines in Israel.**—*Ktavim* (*Rec. agric. Res. Sta., Rehovot*), 1, p. 43, 1950. [Abridged translation from the Hebrew text (pp. 189–197, 5 figs). Received 1953.]

The information in this paper on the *Peridermium* stage of a rust on Aleppo pines (*Pinus halepensis*) in Israel has already been noticed from another source [*R.A.M.*, 29, p. 546].

Boyce (J. S.). **A needle blight of Loblolly Pine caused by the brown-spot fungus.**—*J. For.*, 50, 9, pp. 686–687, 1952.

Scirrhia acicola, responsible for the loblolly pine (*Pinus taeda*) needle blight disease [*R.A.M.*, 32, p. 224], was observed again in the autumn of 1950 on trees of all sizes in the south-eastern United States. Needle die-back symptoms developed on slash pine (*P. caribaea*) seedlings after inoculation with *S. acicola*.

Wright (E.) & Graham (D. P.). **Surveying for pole blight.**—*J. For.*, 50, 9, pp. 680–682, 1 map, 1952.

The 1950 and 1951 aeroplane surveys revealed that the pole blight disease [associated with *Leptographium* sp.] of western white pine (*Pinus monticola*) [*R.A.M.*, 31, p. 306] was present about five miles further south in the St. Joe National Forest, Idaho, than had previously been observed [ibid., 29, p. 282] and is intensifying. The greatest number of pole-blighted stands was observed in the Coeur d'Alene basin, Idaho.

Peace (T. R.). **The defoliation of Pines with particular reference to Lophodermium pinastri.**—*Scot. For.*, 7, 1, pp. 17–22, 1953.

After distinguishing between the different forms of discoloration and defoliation produced on Scots pine in nurseries by wind blast, winter cold, smoke and fumes, and fungal attack, mainly by *Lophodermium pinastri* [*R.A.M.*, 32, pp. 49, 108], the author suggests that defoliation due to *L. pinastri* may be controlled in the nursery by spraying with Bordeaux mixture plus spreader [cf. ibid., 17, p. 214; 20, p. 614] when the needles are half developed and afterwards at monthly intervals until growth ceases. Infected plants should not be left for a second year in the same position in the nursery because of the danger of heavy reinfection from fallen needles. Severely or even completely defoliated plants if lined out generally recover, but any too badly damaged to plant should be burnt. Infection is likely to be most severe in nurseries near pine plantations. Corsican pine [*Pinus nigra* ssp. *laricio*] is generally more resistant than Scots pine to discoloration and defoliation by natural and fungal agencies.

Parker-Rhodes (A. F.). **The basidiomycetes of Thetford Chase I. Correlation with age of plantation.**—*New Phytol.*, 52, 1, pp. 65–70, 1953.

The results of observations on the occurrence of basidiomycetes in plantations of *Pinus sylvestris* at and near Thetford Chase [on the Norfolk-Suffolk border], indicate that most species occupy a given plantation for a substantial proportion of its commercial life. Only a minority exhibit features of interest in a study of successions. Most species enter the plantation at an early age and, apart from an early phase during which non-silvicolous species are eliminated, the rate of loss

from the association increases steadily up to about the 30th year of the plantation. Short-term occupants are most numerous from approximately the 20th to the 30th year which is also the peak for all species together. Those characteristic of the early period tended to be individually more abundant than later occupants. Other correlations between habitat and position in the succession are indicated. The sequence of mycorrhizal fungi demands further study.

Narayanamurti (D.), George (J.), & Verma (G. M.). **Studien zur Biochemie holzzerstörender Pilze. Erste Mitteilung : Säureproduktion der Pilze.** [Studies on the biochemistry of wood-destroying fungi. First note: acid production by fungi.]—*Holz. a. Roh- u. Werkst.*, 10, 6, pp. 227–229, 3 graphs, 1952.

At the Forest Research Institute, Dehra Dun, India, acid production [cf. *R.A.M.*, 7, p. 130; 32, p. 292] by *Polystictus sanguineus*, *Fomes lamaensis*, and *Lenzites sepiaria* was investigated in a malt solution, on malt agar, on a medium containing glucose, cellulose, and peptone, and (in the case of *P. sanguineus*) on *Dalbergia sissoo* wood. After an initial fall the pH values of the media rose, though not to their original level. The lowest value of 3·08 was recorded in the peptone culture of *P. sanguineus*. In malt solution *L. sepiaria* was the weakest acid-producer. Among the acids produced by *P. sanguineus* on wood were formic and butyric, while indications of the presence of acetic acid and ethyl alcohol were detected on malt agar.

Nord (F. F.) & de Stevens (G.). **On the mechanism of lignification.**—*Naturwissenschaften*, 39, 20, pp. 479–480, 1952.

The results of studies at the Department of Organic Chemistry and Enzymology, Fordham University, New York [*R.A.M.*, 31, p. 526], of the oxidation products of the native lignins of white Scots pine wood and spent crushed sugar-cane and those liberated from these two materials by the cellulolytic action of *Lentinus lepideus* [see next abstract] and *Poria vaillantii*, respectively, are used to postulate the process by which lignin is synthesized from carbohydrates.

Bavendamm (W.). **Lentinus lepideus (Buxb.) Fr. Pflanzliche Holzschädlinge.** [*Lentinus lepideus* (Buxb.) Fr. plant wood destroyer.]—*Holz a. Roh- u. Werkst.*, 10, 8, pp. 337–338, 4 figs., 1952.

Important information on *Lentinus lepideus* [see preceding abstract] is summarized under the following headings: general, macroscopic and microscopic diagnostic symptoms of (*a*) the wood rot and (*b*) the fungus, principal physiological data, control measures, and a bibliography of 13 titles. The economic importance of the fungus in Germany [*R.A.M.*, 32, p. 225] lies in its occurrence in the heartwood of conifers and its resistance to impregnation by coal tar oil, used in the treatment, e.g., of sleepers and telegraph poles.

Bavendamm (W.) & Bellmann (H.). **U-Salze. Holzschutzmittel.** [U salts. Wood preservatives.]—*Holz a. Roh- u. Werkst.*, 10, 9, pp. 375–378, 1 fig., 1952.

Information on the U salts used in Germany as timber preservatives [cf. *R.A.M.*, 31, p. 310] is presented under the following headings: general, chemical characterization, efficiency, application, detection reaction, and a bibliography of 22 titles.

Purushotham (A.), Pande (J. N.), & Jadhave (Y. G.). **Wood preservation in India.**—*Indian For.*, 78, 12, pp. 627–634, 2 figs., 1 graph, 1 map, 1952.

In this review the authors outline the history, progress, and value of timber preservation in general and more particularly in the United States [*R.A.M.*, 32, p. 159], Sweden [ibid., 32, p. 1], and Germany [ibid., 32, p. 53]. This is followed by an account of the history of wood preservation in India [ibid., 32, pp. 158, 291].

DORAN (W. L.). **The control of some soil-borne diseases of plants by fungicides applied to the soil in fertilizer.**—*Bull. Mass. agric. Exp. Sta.* 455, 28 pp., 10 figs., 1950. [Received 1952.]

In greenhouse studies at Massachusetts Agricultural Experiment Station the degree of control of club root (*Plasmodiophora brassicae*) in cabbage seedlings given by mercurous chloride (0·25 gm. per sq. ft.) plus hydrated lime (20 gm.) [*R.A.M.*, 31, p. 226] was affected by the moisture content of the soil, infection being reduced from 100 per cent. (in the untreated) to 20 in soil 80 per cent. saturated and to 3·3 per cent. in 50 per cent. saturated [ibid., 28, p. 379].

Onion smut (*Urocystis cepulae*) [loc. cit.] was well controlled by 2·75 gm. per sq. ft. of sodium nitrite applied three days before seeding or by 3 gm. of calcium or potassium nitrite ten days before seeding, the percentages of infection being, respectively, 1·5, 4·5, and 5·3, as against 88 for the untreated. Fermate (0·75 or 1 gm.) applied two days before seeding gave complete control, while the 0·6 and 0·7 gm. dosages ten days before gave, respectively, 5·5 and 0·9 per cent. infection as against 31·5 per cent. for the untreated.

Against damping-off (*Pythium* spp.) [loc. cit.] phygon applied with fertilizer gave good results with eggplant, chilli pepper (*Capsicum frutescens* var. *grossum*), beet, cucumber, and tomato. Stands of the last three were also improved by dithane D-14, dow seed protectant No. 9, thiram, and tuads used similarly. Seed treatment with a potassium dichromate-graphite or an ammonium dichromate-graphite mixture gave good results with beet, chard, cucumber, and tomato. Loss from damping-off, especially of the pre-emergence type, was reduced when the soil at seeding contained moisture at not more than 30 per cent. of its water-holding capacity and watering was delayed until three to five days after seeding.

JACKS (H.). **Seed disinfection. III. Effect of seed dressings applied at different concentrations on emergence of vegetable seedlings. IV. Effect of seed dressings, applied separately or as mixtures, on emergence of certain vegetable seeds.**—*N.Z. J. Sci. Tech.*, Sect. A, 34, 2, pp. 202–205, 206–208, 2 graphs, 1952.

In further studies on seed disinfection in New Zealand [cf. *R.A.M.*, 32, p. 56] cuprocide, spergon, panogen, thiram, ferbam, dow 9B, and 36L were applied to a number of vegetable seeds and determinations were made of the concentration optimum for germination (expressed as percentage of seed weight) from observations on emergence in the greenhouse and field. Lettuce responded best to ferbam at 0·25 per cent. and to all other materials at 0·5; pea to 36L at 0·063, thiram at 0·125, ferbam and dow 9B at 0·5, and other materials at 0·25; bean [*Phaseolus vulgaris*] to spergon and panogen at 0·25, ferbam at 0·5, and other materials at 0·125; beet to panogen, dow 9B, and 36L at 0·5 and thiram at 1; turnip to 36L at 0·25; tomato to panogen at 2 and all other materials except cuprocide at 1; and celery to ferbam at 0·5.

The application of mixed seed protectants to these seeds was no more effective in increasing emergence than their separate use.

HOWARD (H. W.) & LYON (A. G.). **Biological flora of the British Isles. Nasturtium officinale R. Br.**—*J. Ecol.*, 40, 1, pp. 228–238, 1 fig., 1 map, 1952.

This comprehensive study of watercress (*Nasturtium officinale*), *N. microphyllum*, and the hybrid brown watercress includes a section (pp. 237–238) on plant parasites which attack these species. Although *Pythium* spp. [*R.A.M.*, 17, p. 374] are reported to be associated with stem and root rots, recent unpublished work by D. M. Spencer suggests that these and other fungi only attack plants already weakened by *Spongospora* [see next abstract]. Other parasites include *Peronospora parasitica* [cf. ibid., 12, p. 546; 30, p. 345] and *Cystopus candidus*, which attacks only young plants.